

# MASTER STIRM PRO 2-ème année

Contrôle des connaissances 2005/2006

## CRYPTOGRAPHIE

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durée 2 heures

On sera attentif à la précision de la rédaction. Les résultats devront toujours être justifiés que ce soit par une démonstration, un algorithme ou une vérification numérique. Les protocoles seront décrits précisément.

### Documents et calculettes non autorisés

On rappelle les faits et définitions suivants

1. L'ordre d'un groupe multiplicatif fini,  $G$ , est le cardinal de  $G$ .
2. Dans un groupe multiplicatif fini,  $G$ , l'ordre d'un élément  $g \in G$  est le plus petit entier  $a \in \mathbb{N}$ , strictement positif, tel que  $g^a = e$  où  $e$  est l'élément unité du groupe.
3. Dans un groupe multiplicatif fini l'ordre d'un élément est un diviseur de l'ordre du groupe.

### Exercice 1

Décrire le protocole de signature dans le cryptosystème RSA

### Exercice 2

On considère le corps fini à  $2^8 = 256$  éléments,  $\mathbb{F}_{256}$ , représenté par

$$\mathbb{F}_2[X]/X^8 + X^4 + X^3 + X + 1.$$

**Question 1:** Trouvez l'inverse multiplicatif de la classe de  $X^3 + X + 1$  modulo  $X^8 + X^4 + X^3 + X + 1$ .

On rappelle que  $(\mathbb{F}_{256})^* \simeq (\mathbb{F}_2[X]/X^8 + X^4 + X^3 + X + 1)^*$  (les éléments inversibles de  $\mathbb{F}_{256}$  pour la multiplication) est un groupe multiplicatif cyclique, c'est à dire qu'il existe un élément  $g \in (\mathbb{F}_{256})^*$  tel que

$$\text{pour tout } z \in (\mathbb{F}_{256})^* \text{ il existe } a \in \mathbb{N} \text{ tel que } z = g^a = \underbrace{a \times a \times \cdots \times a}_{a \text{ fois}}.$$

**Question 2:** Montrer que si  $g \in (\mathbb{F}_{256})^*$  est un générateur et si  $g^a = 1$  avec  $1 \leq a \leq 255$  alors  $a = 255$ .

**Question 3:** Montrer que si  $P(x) = \sum_{i=0}^n a_i X^i \in \mathbb{F}_2[X]$  alors

$$P^2(X) = \sum_{i=0}^n a_i X^{2i}$$

**Question 4:** Montrer que le polynôme  $P(X) = X$  n'est pas un générateur du groupe multiplicatif  $(\mathbb{F}_2[X]/X^8 + X^4 + X^3 + X + 1)^*$ .

### Exercice 3

**Question 1:** Montrer que 503 et 541 sont premiers. Donner les diviseurs de 502 et 540.

**Question 2:** Décrire le cryptosystème El Gamal.

Alice et Bob veulent correspondre en utilisant le cryptosystème El-Gamal. Ils choisissent leurs paramètres,

- Alice choisit comme nombre premier  $p_a = 503$ .
- Bob choisit comme nombre premier  $p_b = 541$ .

**Question 3:** Alice choisit le générateur  $g_a$  du groupe multiplicatif  $(\mathbb{Z}/503\mathbb{Z})^*$  dans la liste 2, 3, 4, 5, 6, 7. Quels sont ses choix possibles?

**Question 4:** Bob choisit le générateur  $g_b$  du groupe multiplicatif  $(\mathbb{Z}/541\mathbb{Z})^*$  dans la liste 2, 3, 5, 9, 10, 11. Quels sont ses choix possibles?

Ils choisissent chacun le plus grand possible. Ils prennent comme exposant respectif  $\alpha_a = 47$ ,  $\alpha_b = 67$ .

**Question 5:** Donnez les clefs publiques de Bob et d'Alice.

Grâce à ce cryptosystème ils s'envoient des nombres en base 10. Ils codent l'un et l'autre par blocs de 2.

**Question 6:** Bob reçoit le message  $(y_1, y_2) = (76, 251)$ . Donner la formule théorique lui permettant de décoder le message et trouver le message,  $M$  que lui a envoyé Alice par inspection de la table 5?

## Annexe 1: Données numériques

### Tables 1

Puissances de 2 modulo 541: Le premier chiffre représente l'exposant, autrement dit  $[78, 172]$  se lit  $2^{78} \equiv 172 \pmod{541}$

[1, 2], [2, 4], [3, 8], [4, 16], [5, 32], [6, 64], [7, 128], [8, 256], [9, 512], [10, 483], [11, 425], [12, 309], [13, 77], [14, 154], [15, 308], [16, 75], [17, 150], [18, 300], [19, 59], [20, 118], [21, 236], [22, 472], [23, 403], [24, 265], [25, 530], [26, 519], [27, 497], [28, 453], [29, 365], [30, 189], [31, 378], [32, 215], [33, 430], [34, 319], [35, 97], [36, 194], [37, 388], [38, 235], [39, 470], [40, 399], [41, 257], [42, 514], [43, 487], [44, 433], [45, 325], [46, 109], [47, 218], [48, 436], [49, 331], [50, 121], [51, 242], [52, 484], [53, 427], [54, 313], [55, 85], [56, 170], [57, 340], [58, 139], [59, 278], [60, 15], [61, 30], [62, 60], [63, 120], [64, 240], [65, 480], [66, 419], [67, 297], [68, 53], [69, 106], [70, 212], [71, 424], [72, 307], [73, 73], [74, 146], [75, 292], [76, 43], [77, 86], [78, 172], [79, 344], [80, 147], [81, 294], [82, 47], [83, 94], [84, 188], [85, 376], [86, 211], [87, 422], [88, 303], [89, 65], [90, 130], [91, 260], [92, 520], [93, 499], [94, 457], [95, 373], [96, 205], [97, 410], [98, 279], [99, 17], [100, 34], [101, 68], [102, 136], [103, 272], [104, 3], [105, 6], [106, 12], [107, 24], [108, 48], [109, 96], [110, 192], [111, 384], [112, 227], [113, 454], [114, 367], [115, 193], [116, 386], [117, 231], [118, 462], [119, 383], [120, 225], [121, 450], [122, 359], [123, 177], [124, 354], [125, 167], [126, 334], [127, 127], [128, 254], [129, 508], [130, 475], [131, 409], [132, 277], [133, 13], [134, 26], [135, 52], [136, 104], [137, 208], [138, 416], [139, 291], [140, 41], [141, 82], [142, 164], [143, 328], [144, 115], [145, 230], [146, 460], [147, 379], [148, 217], [149, 434], [150, 327], [151, 113], [152, 226], [153, 452], [154, 363], [155, 185], [156, 370], [157, 199], [158, 398], [159, 255], [160, 510], [161, 479], [162, 417], [163, 293], [164, 45], [165, 90], [166, 180], [167, 360], [168, 179], [169, 358], [170, 175], [171, 350], [172, 159], [173, 318], [174, 95], [175, 190], [176, 380], [177, 219], [178, 438], [179, 335], [180, 129], [181, 258], [182, 516], [183, 491], [184, 441], [185, 341], [186, 141], [187, 282], [188, 23], [189, 46], [190, 92], [191, 184], [192, 368], [193, 195], [194, 390], [195, 239], [196, 478], [197, 415], [198, 289], [199, 37], [200, 74], [201, 148], [202, 296], [203, 51], [204, 102], [205, 204], [206, 408], [207, 275], [208, 9], [209, 18], [210, 36], [211, 72], [212, 144], [213, 288], [214, 35], [215, 70], [216, 140], [217, 280], [218, 19], [219, 38], [220, 76], [221, 152], [222, 304], [223, 67], [224, 134], [225, 268], [226, 536], [227, 531], [228, 521], [229, 501], [230, 461], [231, 381], [232, 221], [233, 442], [234, 343], [235, 145], [236, 290], [237, 39], [238, 78], [239, 156], [240, 312], [241, 83], [242, 166], [243, 332], [244, 123], [245, 246], [246, 492], [247, 443], [248, 345], [249, 149], [250, 298], [251, 55], [252, 110], [253, 220], [254, 440], [255, 339], [256, 137], [257, 274], [258, 7], [259, 14], [260, 28], [261, 56], [262, 112], [263, 224], [264, 448], [265, 355], [266, 169], [267, 338], [268, 135], [269, 270], [270, 540],

[271, 539], [272, 537], [273, 533], [274, 525], [275, 509], [276, 477], [277, 413],  
[278, 285], [279, 29], [280, 58], [281, 116], [282, 232], [283, 464], [284, 387],  
[285, 233], [286, 466], [287, 391], [288, 241], [289, 482], [290, 423], [291, 305],  
[292, 69], [293, 138], [294, 276], [295, 11], [296, 22], [297, 44], [298, 88],  
[299, 176], [300, 352], [301, 163], [302, 326], [303, 111], [304, 222], [305, 444],  
[306, 347], [307, 153], [308, 306], [309, 71], [310, 142], [311, 284], [312, 27],  
[313, 54], [314, 108], [315, 216], [316, 432], [317, 323], [318, 105], [319, 210],  
[320, 420], [321, 299], [322, 57], [323, 114], [324, 228], [325, 456], [326, 371],  
[327, 201], [328, 402], [329, 263], [330, 526], [331, 511], [332, 481], [333, 421],  
[334, 301], [335, 61], [336, 122], [337, 244], [338, 488], [339, 435], [340, 329],  
[341, 117], [342, 234], [343, 468], [344, 395], [345, 249], [346, 498], [347, 455],  
[348, 369], [349, 197], [350, 394], [351, 247], [352, 494], [353, 447], [354, 353],  
[355, 165], [356, 330], [357, 119], [358, 238], [359, 476], [360, 411], [361, 281],  
[362, 21], [363, 42], [364, 84], [365, 168], [366, 336], [367, 131], [368, 262],  
[369, 524], [370, 507], [371, 473], [372, 405], [373, 269], [374, 538], [375, 535],  
[376, 529], [377, 517], [378, 493], [379, 445], [380, 349], [381, 157], [382, 314],  
[383, 87], [384, 174], [385, 348], [386, 155], [387, 310], [388, 79], [389, 158],  
[390, 316], [391, 91], [392, 182], [393, 364], [394, 187], [395, 374], [396, 207],  
[397, 414], [398, 287], [399, 33], [400, 66], [401, 132], [402, 264], [403, 528],  
[404, 515], [405, 489], [406, 437], [407, 333], [408, 125], [409, 250], [410, 500],  
[411, 459], [412, 377], [413, 213], [414, 426], [415, 311], [416, 81], [417, 162],  
[418, 324], [419, 107], [420, 214], [421, 428], [422, 315], [423, 89], [424, 178],  
[425, 356], [426, 171], [427, 342], [428, 143], [429, 286], [430, 31], [431, 62],  
[432, 124], [433, 248], [434, 496], [435, 451], [436, 361], [437, 181], [438, 362],  
[439, 183], [440, 366], [441, 191], [442, 382], [443, 223], [444, 446], [445, 351],  
[446, 161], [447, 322], [448, 103], [449, 206], [450, 412], [451, 283], [452, 25],  
[453, 50], [454, 100], [455, 200], [456, 400], [457, 259], [458, 518], [459, 495],  
[460, 449], [461, 357], [462, 173], [463, 346], [464, 151], [465, 302], [466, 63],  
[467, 126], [468, 252], [469, 504], [470, 467], [471, 393], [472, 245], [473, 490],  
[474, 439], [475, 337], [476, 133], [477, 266], [478, 532], [479, 523], [480, 505],  
[481, 469], [482, 397], [483, 253], [484, 506], [485, 471], [486, 401], [487, 261],  
[488, 522], [489, 503], [490, 465], [491, 389], [492, 237], [493, 474], [494, 407],  
[495, 273], [496, 5], [497, 10], [498, 20], [499, 40], [500, 80], [501, 160],  
[502, 320], [503, 99], [504, 198], [505, 396], [506, 251], [507, 502], [508, 463],  
[509, 385], [510, 229], [511, 458], [512, 375], [513, 209], [514, 418], [515, 295],  
[516, 49], [517, 98], [518, 196], [519, 392], [520, 243], [521, 486], [522, 431],  
[523, 321], [524, 101], [525, 202], [526, 404], [527, 267], [528, 534], [529, 527],  
[530, 513], [531, 485], [532, 429], [533, 317], [534, 93], [535, 186], [536, 372],  
[537, 203], [538, 406], [539, 271], [540, 1]

## Tables 2

Puissances de 3 modulo 541: Le premier chiffre représente l'exposant, autrement dit  $[78, 309]$  se lit  $3^{78} \equiv 309 \pmod{541}$

[1, 3], [2, 9], [3, 27], [4, 81], [5, 243], [6, 188], [7, 23], [8, 69], [9, 207], [10, 80],  
[11, 240], [12, 179], [13, 537], [14, 529], [15, 505], [16, 433], [17, 217], [18, 110],  
[19, 330], [20, 449], [21, 265], [22, 254], [23, 221], [24, 122], [25, 366], [26, 16],  
[27, 48], [28, 144], [29, 432], [30, 214], [31, 101], [32, 303], [33, 368], [34, 22],  
[35, 66], [36, 198], [37, 53], [38, 159], [39, 477], [40, 349], [41, 506], [42, 436],  
[43, 226], [44, 137], [45, 411], [46, 151], [47, 453], [48, 277], [49, 290], [50, 329],  
[51, 446], [52, 256], [53, 227], [54, 140], [55, 420], [56, 178], [57, 534], [58, 520],  
[59, 478], [60, 352], [61, 515], [62, 463], [63, 307], [64, 380], [65, 58], [66, 174],  
[67, 522], [68, 484], [69, 370], [70, 28], [71, 84], [72, 252], [73, 215], [74, 104],  
[75, 312], [76, 395], [77, 103], [78, 309], [79, 386], [80, 76], [81, 228], [82, 143],  
[83, 429], [84, 205], [85, 74], [86, 222], [87, 125], [88, 375], [89, 43], [90, 129],  
[91, 387], [92, 79], [93, 237], [94, 170], [95, 510], [96, 448], [97, 262], [98, 245],  
[99, 194], [100, 41], [101, 123], [102, 369], [103, 25], [104, 75], [105, 225],  
[106, 134], [107, 402], [108, 124], [109, 372], [110, 34], [111, 102], [112, 306],  
[113, 377], [114, 49], [115, 147], [116, 441], [117, 241], [118, 182], [119, 5],  
[120, 15], [121, 45], [122, 135], [123, 405], [124, 133], [125, 399], [126, 115],  
[127, 345], [128, 494], [129, 400], [130, 118], [131, 354], [132, 521], [133, 481],  
[134, 361], [135, 1], [136, 3], [137, 9], [138, 27], [139, 81], [140, 243], [141, 188],  
[142, 23], [143, 69], [144, 207], [145, 80], [146, 240], [147, 179], [148, 537],  
[149, 529], [150, 505], [151, 433], [152, 217], [153, 110], [154, 330], [155, 449],  
[156, 265], [157, 254], [158, 221], [159, 122], [160, 366], [161, 16], [162, 48],  
[163, 144], [164, 432], [165, 214], [166, 101], [167, 303], [168, 368], [169, 22],  
[170, 66], [171, 198], [172, 53], [173, 159], [174, 477], [175, 349], [176, 506],  
[177, 436], [178, 226], [179, 137], [180, 411], [181, 151], [182, 453], [183, 277],  
[184, 290], [185, 329], [186, 446], [187, 256], [188, 227], [189, 140], [190, 420],  
[191, 178], [192, 534], [193, 520], [194, 478], [195, 352], [196, 515], [197, 463],  
[198, 307], [199, 380], [200, 58], [201, 174], [202, 522], [203, 484], [204, 370],  
[205, 28], [206, 84], [207, 252], [208, 215], [209, 104], [210, 312], [211, 395],  
[212, 103], [213, 309], [214, 386], [215, 76], [216, 228], [217, 143], [218, 429],  
[219, 205], [220, 74], [221, 222], [222, 125], [223, 375], [224, 43], [225, 129],  
[226, 387], [227, 79], [228, 237], [229, 170], [230, 510], [231, 448], [232, 262],  
[233, 245], [234, 194], [235, 41], [236, 123], [237, 369], [238, 25], [239, 75],  
[240, 225], [241, 134], [242, 402], [243, 124], [244, 372], [245, 34], [246, 102],  
[247, 306], [248, 377], [249, 49], [250, 147], [251, 441], [252, 241], [253, 182],  
[254, 5], [255, 15], [256, 45], [257, 135], [258, 405], [259, 133], [260, 399],  
[261, 115], [262, 345], [263, 494], [264, 400], [265, 118], [266, 354], [267, 521],  
[268, 481], [269, 361], [270, 1]

[271, 3], [272, 9], [273, 27], [274, 81] [275, 243], [276, 188], [277, 23], [278, 69],  
[279, 207], [280, 80] [281, 240], [282, 179], [283, 537], [284, 529], [285, 505],  
[286, 433] [287, 217], [288, 110], [289, 330], [290, 449], [291, 265], [292, 254]  
[293, 221], [294, 122], [295, 366], [296, 16], [297, 48], [298, 144] [299, 432],  
[300, 214], [301, 101], [302, 303], [303, 368], [304, 22] [305, 66], [306, 198],  
[307, 53], [308, 159], [309, 477], [310, 349] [311, 506], [312, 436], [313, 226],  
[314, 137], [315, 411], [316, 151] [317, 453], [318, 277], [319, 290], [320, 329],  
[321, 446], [322, 256] [323, 227], [324, 140], [325, 420], [326, 178], [327, 534],  
[328, 520] [329, 478], [330, 352], [331, 515], [332, 463], [333, 307], [334, 380]  
[335, 58], [336, 174], [337, 522], [338, 484], [339, 370], [340, 28] [341, 84],  
[342, 252], [343, 215], [344, 104], [345, 312], [346, 395] [347, 103], [348, 309],  
[349, 386], [350, 76], [351, 228], [352, 143] [353, 429], [354, 205], [355, 74],  
[356, 222], [357, 125], [358, 375] [359, 43], [360, 129], [361, 387], [362, 79],  
[363, 237], [364, 170], [365, 510], [366, 448], [367, 262], [368, 245], [369, 194],  
[370, 41], [371, 123], [372, 369], [373, 25], [374, 75], [375, 225], [376, 134],  
[377, 402], [378, 124], [379, 372], [380, 34], [381, 102], [382, 306], [383, 377],  
[384, 49], [385, 147], [386, 441], [387, 241], [388, 182], [389, 5], [390, 15],  
[391, 45], [392, 135], [393, 405], [394, 133], [395, 399], [396, 115], [397, 345],  
[398, 494], [399, 400], [400, 118], [401, 354], [402, 521], [403, 481], [404, 361],  
[405, 1], [406, 3], [407, 9], [408, 27], [409, 81], [410, 243], [411, 188], [412, 23],  
[413, 69], [414, 207], [415, 80], [416, 240], [417, 179], [418, 537], [419, 529],  
[420, 505], [421, 433], [422, 217], [423, 110], [424, 330], [425, 449], [426, 265],  
[427, 254], [428, 221], [429, 122], [430, 366], [431, 16], [432, 48], [433, 144],  
[434, 432], [435, 214], [436, 101], [437, 303], [438, 368], [439, 22], [440, 66],  
[441, 198], [442, 53], [443, 159], [444, 477], [445, 349], [446, 506], [447, 436],  
[448, 226], [449, 137], [450, 411], [451, 151], [452, 453], [453, 277], [454, 290],  
[455, 329], [456, 446], [457, 256], [458, 227], [459, 140], [460, 420], [461, 178],  
[462, 534], [463, 520], [464, 478], [465, 352], [466, 515], [467, 463], [468, 307],  
[469, 380], [470, 58], [471, 174], [472, 522], [473, 484], [474, 370], [475, 28],  
[476, 84], [477, 252], [478, 215], [479, 104], [480, 312], [481, 395], [482, 103],  
[483, 309], [484, 386], [485, 76], [486, 228], [487, 143], [488, 429], [489, 205],  
[490, 74], [491, 222], [492, 125], [493, 375], [494, 43], [495, 129], [496, 387],  
[497, 79], [498, 237], [499, 170], [500, 510], [501, 448], [502, 262], [503, 245],  
[504, 194], [505, 41], [506, 123], [507, 369], [508, 25], [509, 75], [510, 225],  
[511, 134], [512, 402], [513, 124], [514, 372], [515, 34], [516, 102], [517, 306],  
[518, 377], [519, 49], [520, 147], [521, 441], [522, 241], [523, 182], [524, 5],  
[525, 15], [526, 45], [527, 135], [528, 405], [529, 133], [530, 399], [531, 115],  
[532, 345], [533, 494], [534, 400], [535, 118], [536, 354], [537, 521], [538, 481],  
[539, 361], [540, 1]

### Tables 3

Puissances de 5 modulo 541: Le premier chiffre représente l'exposant, autrement dit  $[78, 369]$  se lit  $5^{78} \equiv 369 \pmod{541}$

[1, 5], [2, 25], [3, 125], [4, 84], [5, 420], [6, 477], [7, 221], [8, 23], [9, 115], [10, 34], [11, 170], [12, 309], [13, 463], [14, 151], [15, 214], [16, 529], [17, 481], [18, 241], [19, 123], [20, 74], [21, 370], [22, 227], [23, 53], [24, 265], [25, 243], [26, 133], [27, 124], [28, 79], [29, 395], [30, 352], [31, 137], [32, 144], [33, 179], [34, 354], [35, 147], [36, 194], [37, 429], [38, 522], [39, 446], [40, 66], [41, 330], [42, 27], [43, 135], [44, 134], [45, 129], [46, 104], [47, 520], [48, 436], [49, 16], [50, 80], [51, 400], [52, 377], [53, 262], [54, 228], [55, 58], [56, 290], [57, 368], [58, 217], [59, 3], [60, 15], [61, 75], [62, 375], [63, 252], [64, 178], [65, 349], [66, 122], [67, 69], [68, 345], [69, 102], [70, 510], [71, 386], [72, 307], [73, 453], [74, 101], [75, 505], [76, 361], [77, 182], [78, 369], [79, 222], [80, 28], [81, 140], [82, 159], [83, 254], [84, 188], [85, 399], [86, 372], [87, 237], [88, 103], [89, 515], [90, 411], [91, 432], [92, 537], [93, 521], [94, 441], [95, 41], [96, 205], [97, 484], [98, 256], [99, 198], [100, 449], [101, 81], [102, 405], [103, 402], [104, 387], [105, 312], [106, 478], [107, 226], [108, 48], [109, 240], [110, 118], [111, 49], [112, 245], [113, 143], [114, 174], [115, 329], [116, 22], [117, 110], [118, 9], [119, 45], [120, 225], [121, 43], [122, 215], [123, 534], [124, 506], [125, 366], [126, 207], [127, 494], [128, 306], [129, 448], [130, 76], [131, 380], [132, 277], [133, 303], [134, 433], [135, 1], [136, 5], [137, 25], [138, 125], [139, 84], [140, 420], [141, 477], [142, 221], [143, 23], [144, 115], [145, 34], [146, 170], [147, 309], [148, 463], [149, 151], [150, 214], [151, 529], [152, 481], [153, 241], [154, 123], [155, 74], [156, 370], [157, 227], [158, 53], [159, 265], [160, 243], [161, 133], [162, 124], [163, 79], [164, 395], [165, 352], [166, 137], [167, 144], [168, 179], [169, 354], [170, 147], [171, 194], [172, 429], [173, 522], [174, 446], [175, 66], [176, 330], [177, 27], [178, 135], [179, 134], [180, 129], [181, 104], [182, 520], [183, 436], [184, 16], [185, 80], [186, 400], [187, 377], [188, 262], [189, 228], [190, 58], [191, 290], [192, 368], [193, 217], [194, 3], [195, 15], [196, 75], [197, 375], [198, 252], [199, 178], [200, 349], [201, 122], [202, 69], [203, 345], [204, 102], [205, 510], [206, 386], [207, 307], [208, 453], [209, 101], [210, 505], [211, 361], [212, 182], [213, 369], [214, 222], [215, 28], [216, 140], [217, 159], [218, 254], [219, 188], [220, 399], [221, 372], [222, 237], [223, 103], [224, 515], [225, 411], [226, 432], [227, 537], [228, 521], [229, 441], [230, 41], [231, 205], [232, 484], [233, 256], [234, 198], [235, 449], [236, 81], [237, 405], [238, 402], [239, 387], [240, 312], [241, 478], [242, 226], [243, 48], [244, 240], [245, 118], [246, 49], [247, 245], [248, 143], [249, 174], [250, 329], [251, 22], [252, 110], [253, 9], [254, 45], [255, 225], [256, 43], [257, 215], [258, 534], [259, 506], [260, 366], [261, 207], [262, 494], [263, 306], [264, 448], [265, 76], [266, 380], [267, 277], [268, 303], [269, 433], [270, 1],

[271, 5], [272, 25], [273, 125], [274, 84], [275, 420], [276, 477], [277, 221],  
[278, 23], [279, 115], [280, 34], [281, 170], [282, 309], [283, 463], [284, 151],  
[285, 214], [286, 529], [287, 481], [288, 241], [289, 123], [290, 74], [291, 370],  
[292, 227], [293, 53], [294, 265], [295, 243], [296, 133], [297, 124], [298, 79],  
[299, 395], [300, 352], [301, 137], [302, 144], [303, 179], [304, 354], [305, 147],  
[306, 194], [307, 429], [308, 522], [309, 446], [310, 66], [311, 330], [312, 27],  
[313, 135], [314, 134], [315, 129], [316, 104], [317, 520], [318, 436], [319, 16],  
[320, 80], [321, 400], [322, 377], [323, 262], [324, 228], [325, 58], [326, 290],  
[327, 368], [328, 217], [329, 3], [330, 15], [331, 75], [332, 375], [333, 252],  
[334, 178], [335, 349], [336, 122], [337, 69], [338, 345], [339, 102], [340, 510],  
[341, 386], [342, 307], [343, 453], [344, 101], [345, 505], [346, 361], [347, 182],  
[348, 369], [349, 222], [350, 28], [351, 140], [352, 159], [353, 254], [354, 188],  
[355, 399], [356, 372], [357, 237], [358, 103], [359, 515], [360, 411], [361, 432],  
[362, 537], [363, 521], [364, 441], [365, 41], [366, 205], [367, 484], [368, 256],  
[369, 198], [370, 449], [371, 81], [372, 405], [373, 402], [374, 387], [375, 312],  
[376, 478], [377, 226], [378, 48], [379, 240], [380, 118], [381, 49], [382, 245],  
[383, 143], [384, 174], [385, 329], [386, 22], [387, 110], [388, 9], [389, 45],  
[390, 225], [391, 43], [392, 215], [393, 534], [394, 506], [395, 366], [396, 207],  
[397, 494], [398, 306], [399, 448], [400, 76], [401, 380], [402, 277], [403, 303],  
[404, 433], [405, 1], [406, 5], [407, 25], [408, 125], [409, 84], [410, 420],  
[411, 477], [412, 221], [413, 23], [414, 115], [415, 34], [416, 170], [417, 309],  
[418, 463], [419, 151], [420, 214], [421, 529], [422, 481], [423, 241], [424, 123],  
[425, 74], [426, 370], [427, 227], [428, 53], [429, 265], [430, 243], [431, 133],  
[432, 124], [433, 79], [434, 395], [435, 352], [436, 137], [437, 144], [438, 179],  
[439, 354], [440, 147], [441, 194], [442, 429], [443, 522], [444, 446], [445, 66],  
[446, 330], [447, 27], [448, 135], [449, 134], [450, 129], [451, 104], [452, 520],  
[453, 436], [454, 16], [455, 80], [456, 400], [457, 377], [458, 262], [459, 228],  
[460, 58], [461, 290], [462, 368], [463, 217], [464, 3], [465, 15], [466, 75],  
[467, 375], [468, 252], [469, 178], [470, 349], [471, 122], [472, 69], [473, 345],  
[474, 102], [475, 510], [476, 386], [477, 307], [478, 453], [479, 101], [480, 505],  
[481, 361], [482, 182], [483, 369], [484, 222], [485, 28], [486, 140], [487, 159],  
[488, 254], [489, 188], [490, 399], [491, 372], [492, 237], [493, 103], [494, 515],  
[495, 411], [496, 432], [497, 537], [498, 521], [499, 441], [500, 41], [501, 205],  
[502, 484], [503, 256], [504, 198], [505, 449], [506, 81], [507, 405], [508, 402],  
[509, 387], [510, 312], [511, 478], [512, 226], [513, 48], [514, 240], [515, 118],  
[516, 49], [517, 245], [518, 143], [519, 174], [520, 329], [521, 22], [522, 110],  
[523, 9], [524, 45], [525, 225], [526, 43], [527, 215], [528, 534], [529, 506],  
[530, 366], [531, 207], [532, 494], [533, 306], [534, 448], [535, 76], [536, 380],  
[537, 277], [538, 303], [539, 433], [540, 1]

## Tables 4

Puissances de 9 modulo 541: Le premier chiffre représente l'exposant, autrement dit  $[78, 265]$  se lit  $9^{78} \equiv 265 \pmod{541}$

[1, 9], [2, 81], [3, 188], [4, 69], [5, 80], [6, 179], [7, 529], [8, 433], [9, 110],  
[10, 449], [11, 254], [12, 122], [13, 16], [14, 144], [15, 214], [16, 303], [17, 22],  
[18, 198], [19, 159], [20, 349], [21, 436], [22, 137], [23, 151], [24, 277], [25, 329],  
[26, 256], [27, 140], [28, 178], [29, 520], [30, 352], [31, 463], [32, 380], [33, 174],  
[34, 484], [35, 28], [36, 252], [37, 104], [38, 395], [39, 309], [40, 76], [41, 143],  
[42, 205], [43, 222], [44, 375], [45, 129], [46, 79], [47, 170], [48, 448], [49, 245],  
[50, 41], [51, 369], [52, 75], [53, 134], [54, 124], [55, 34], [56, 306], [57, 49],  
[58, 441], [59, 182], [60, 15], [61, 135], [62, 133], [63, 115], [64, 494], [65, 118],  
[66, 521], [67, 361], [68, 3], [69, 27], [70, 243], [71, 23], [72, 207], [73, 240],  
[74, 537], [75, 505], [76, 217], [77, 330], [78, 265], [79, 221], [80, 366], [81, 48],  
[82, 432], [83, 101], [84, 368], [85, 66], [86, 53], [87, 477], [88, 506], [89, 226],  
[90, 411], [91, 453], [92, 290], [93, 446], [94, 227], [95, 420], [96, 534], [97, 478],  
[98, 515], [99, 307], [100, 58], [101, 522], [102, 370], [103, 84], [104, 215],  
[105, 312], [106, 103], [107, 386], [108, 228], [109, 429], [110, 74], [111, 125],  
[112, 43], [113, 387], [114, 237], [115, 510], [116, 262], [117, 194], [118, 123],  
[119, 25], [120, 225], [121, 402], [122, 372], [123, 102], [124, 377], [125, 147],  
[126, 241], [127, 5], [128, 45], [129, 405], [130, 399], [131, 345], [132, 400],  
[133, 354], [134, 481], [135, 1], [136, 9], [137, 81], [138, 188], [139, 69], [140, 80],  
[141, 179], [142, 529], [143, 433], [144, 110], [145, 449], [146, 254], [147, 122],  
[148, 16], [149, 144], [150, 214], [151, 303], [152, 22], [153, 198], [154, 159],  
[155, 349], [156, 436], [157, 137], [158, 151], [159, 277], [160, 329], [161, 256],  
[162, 140], [163, 178], [164, 520], [165, 352], [166, 463], [167, 380], [168, 174],  
[169, 484], [170, 28], [171, 252], [172, 104], [173, 395], [174, 309], [175, 76],  
[176, 143], [177, 205], [178, 222], [179, 375], [180, 129], [181, 79], [182, 170],  
[183, 448], [184, 245], [185, 41], [186, 369], [187, 75], [188, 134], [189, 124],  
[190, 34], [191, 306], [192, 49], [193, 441], [194, 182], [195, 15], [196, 135],  
[197, 133], [198, 115], [199, 494], [200, 118], [201, 521], [202, 361], [203, 3],  
[204, 27], [205, 243], [206, 23], [207, 207], [208, 240], [209, 537], [210, 505],  
[211, 217], [212, 330], [213, 265], [214, 221], [215, 366], [216, 48], [217, 432],  
[218, 101], [219, 368], [220, 66], [221, 53], [222, 477], [223, 506], [224, 226],  
[225, 411], [226, 453], [227, 290], [228, 446], [229, 227], [230, 420], [231, 534],  
[232, 478], [233, 515], [234, 307], [235, 58], [236, 522], [237, 370], [238, 84],  
[239, 215], [240, 312], [241, 103], [242, 386], [243, 228], [244, 429], [245, 74],  
[246, 125], [247, 43], [248, 387], [249, 237], [250, 510], [251, 262], [252, 194],  
[253, 123], [254, 25], [255, 225], [256, 402], [257, 372], [258, 102], [259, 377],  
[260, 147], [261, 241], [262, 5], [263, 45], [264, 405], [265, 399], [266, 345],  
[267, 400], [268, 354], [269, 481], [270, 1],

[271, 9], [272, 81], [273, 188], [274, 69], [275, 80], [276, 179], [277, 529],  
[278, 433], [279, 110], [280, 449], [281, 254], [282, 122], [283, 16], [284, 144],  
[285, 214], [286, 303], [287, 22], [288, 198], [289, 159], [290, 349], [291, 436],  
[292, 137], [293, 151], [294, 277], [295, 329], [296, 256], [297, 140], [298, 178],  
[299, 520], [300, 352], [301, 463], [302, 380], [303, 174], [304, 484], [305, 28],  
[306, 252], [307, 104], [308, 395], [309, 309], [310, 76], [311, 143], [312, 205],  
[313, 222], [314, 375], [315, 129], [316, 79], [317, 170], [318, 448], [319, 245],  
[320, 41], [321, 369], [322, 75], [323, 134], [324, 124], [325, 34], [326, 306],  
[327, 49], [328, 441], [329, 182], [330, 15], [331, 135], [332, 133], [333, 115],  
[334, 494], [335, 118], [336, 521], [337, 361], [338, 3], [339, 27], [340, 243],  
[341, 23], [342, 207], [343, 240], [344, 537], [345, 505], [346, 217], [347, 330],  
[348, 265], [349, 221], [350, 366], [351, 48], [352, 432], [353, 101], [354, 368],  
[355, 66], [356, 53], [357, 477], [358, 506], [359, 226], [360, 411], [361, 453],  
[362, 290], [363, 446], [364, 227], [365, 420], [366, 534], [367, 478], [368, 515],  
[369, 307], [370, 58], [371, 522], [372, 370], [373, 84], [374, 215], [375, 312],  
[376, 103], [377, 386], [378, 228], [379, 429], [380, 74], [381, 125], [382, 43],  
[383, 387], [384, 237], [385, 510], [386, 262], [387, 194], [388, 123], [389, 25],  
[390, 225], [391, 402], [392, 372], [393, 102], [394, 377], [395, 147], [396, 241],  
[397, 5], [398, 45], [399, 405], [400, 399], [401, 345], [402, 400], [403, 354],  
[404, 481], [405, 1], [406, 9], [407, 81], [408, 188], [409, 69], [410, 80], [411, 179],  
[412, 529], [413, 433], [414, 110], [415, 449], [416, 254], [417, 122], [418, 16],  
[419, 144], [420, 214], [421, 303], [422, 22], [423, 198], [424, 159], [425, 349],  
[426, 436], [427, 137], [428, 151], [429, 277], [430, 329], [431, 256], [432, 140],  
[433, 178], [434, 520], [435, 352], [436, 463], [437, 380], [438, 174], [439, 484],  
[440, 28], [441, 252], [442, 104], [443, 395], [444, 309], [445, 76], [446, 143],  
[447, 205], [448, 222], [449, 375], [450, 129], [451, 79], [452, 170], [453, 448],  
[454, 245], [455, 41], [456, 369], [457, 75], [458, 134], [459, 124], [460, 34],  
[461, 306], [462, 49], [463, 441], [464, 182], [465, 15], [466, 135], [467, 133],  
[468, 115], [469, 494], [470, 118], [471, 521], [472, 361], [473, 3], [474, 27],  
[475, 243], [476, 23], [477, 207], [478, 240], [479, 537], [480, 505], [481, 217],  
[482, 330], [483, 265], [484, 221], [485, 366], [486, 48], [487, 432], [488, 101],  
[489, 368], [490, 66], [491, 53], [492, 477], [493, 506], [494, 226], [495, 411],  
[496, 453], [497, 290], [498, 446], [499, 227], [500, 420], [501, 534], [502, 478],  
[503, 515], [504, 307], [505, 58], [506, 522], [507, 370], [508, 84], [509, 215],  
[510, 312], [511, 103], [512, 386], [513, 228], [514, 429], [515, 74], [516, 125],  
[517, 43], [518, 387], [519, 237], [520, 510], [521, 262], [522, 194], [523, 123],  
[524, 25], [525, 225], [526, 402], [527, 372], [528, 102], [529, 377], [530, 147],  
[531, 241], [532, 5], [533, 45], [534, 405], [535, 399], [536, 345], [537, 400],  
[538, 354], [539, 481], [540, 1]

## Tables 5

Puissances de 10 modulo 541: Le premier chiffre représente l'exposant, autrement dit  $[78, 171]$  se lit  $10^{78} \equiv 171 \pmod{541}$

[1, 10], [2, 100], [3, 459], [4, 262], [5, 456], [6, 232], [7, 156], [8, 478], [9, 452],  
 [10, 192], [11, 297], [12, 265], [13, 486], [14, 532], [15, 451], [16, 182], [17, 197],  
 [18, 347], [19, 224], [20, 76], [21, 219], [22, 26], [23, 260], [24, 436], [25, 32],  
 [26, 320], [27, 495], [28, 81], [29, 269], [30, 526], [31, 391], [32, 123], [33, 148],  
 [34, 398], [35, 193], [36, 307], [37, 365], [38, 404], [39, 253], [40, 366], [41, 414],  
 [42, 353], [43, 284], [44, 135], [45, 268], [46, 516], [47, 291], [48, 205], [49, 427],  
 [50, 483], [51, 502], [52, 151], [53, 428], [54, 493], [55, 61], [56, 69], [57, 149],  
 [58, 408], [59, 293], [60, 225], [61, 86], [62, 319], [63, 485], [64, 522], [65, 351],  
 [66, 264], [67, 476], [68, 432], [69, 533], [70, 461], [71, 282], [72, 115], [73, 68],  
 [74, 139], [75, 308], [76, 375], [77, 504], [78, 171], [79, 87], [80, 329], [81, 44],  
 [82, 440], [83, 72], [84, 179], [85, 167], [86, 47], [87, 470], [88, 372], [89, 474],  
 [90, 412], [91, 333], [92, 84], [93, 299], [94, 285], [95, 145], [96, 368], [97, 434],  
 [98, 12], [99, 120], [100, 118], [101, 98], [102, 439], [103, 62], [104, 79],  
 [105, 249], [106, 326], [107, 14], [108, 140], [109, 318], [110, 475], [111, 422],  
 [112, 433], [113, 2], [114, 20], [115, 200], [116, 377], [117, 524], [118, 371],  
 [119, 464], [120, 312], [121, 415], [122, 363], [123, 384], [124, 53], [125, 530],  
 [126, 431], [127, 523], [128, 361], [129, 364], [130, 394], [131, 153], [132, 448],  
 [133, 152], [134, 438], [135, 52], [136, 520], [137, 331], [138, 64], [139, 99],  
 [140, 449], [141, 162], [142, 538], [143, 511], [144, 241], [145, 246], [146, 296],  
 [147, 255], [148, 386], [149, 73], [150, 189], [151, 267], [152, 506], [153, 191],  
 [154, 287], [155, 165], [156, 27], [157, 270], [158, 536], [159, 491], [160, 41],  
 [161, 410], [162, 313], [163, 425], [164, 463], [165, 302], [166, 315], [167, 445],  
 [168, 122], [169, 138], [170, 298], [171, 275], [172, 45], [173, 450], [174, 172],  
 [175, 97], [176, 429], [177, 503], [178, 161], [179, 528], [180, 411], [181, 323],  
 [182, 525], [183, 381], [184, 23], [185, 230], [186, 136], [187, 278], [188, 75],  
 [189, 209], [190, 467], [191, 342], [192, 174], [193, 117], [194, 88], [195, 339],  
 [196, 144], [197, 358], [198, 334], [199, 94], [200, 399], [201, 203], [202, 407],  
 [203, 283], [204, 125], [205, 168], [206, 57], [207, 29], [208, 290], [209, 195],  
 [210, 327], [211, 24], [212, 240], [213, 236], [214, 196], [215, 337], [216, 124],  
 [217, 158], [218, 498], [219, 111], [220, 28], [221, 280], [222, 95], [223, 409],  
 [224, 303], [225, 325], [226, 4], [227, 40], [228, 400], [229, 213], [230, 507],  
 [231, 201], [232, 387], [233, 83], [234, 289], [235, 185], [236, 227], [237, 106],  
 [238, 519], [239, 321], [240, 505], [241, 181], [242, 187], [243, 247], [244, 306],  
 [245, 355], [246, 304], [247, 335], [248, 104], [249, 499], [250, 121], [251, 128],  
 [252, 198], [253, 357], [254, 324], [255, 535], [256, 481], [257, 482], [258, 492],  
 [259, 51], [260, 510], [261, 231], [262, 146], [263, 378], [264, 534], [265, 471],  
 [266, 382], [267, 33], [268, 330], [269, 54], [270, 540],

[271, 531], [272, 441], [273, 82], [274, 279], [275, 85], [276, 309], [277, 385],  
 [278, 63], [279, 89], [280, 349], [281, 244], [282, 276], [283, 55], [284, 9],  
 [285, 90], [286, 359], [287, 344], [288, 194], [289, 317], [290, 465], [291, 322],  
 [292, 515], [293, 281], [294, 105], [295, 509], [296, 221], [297, 46], [298, 460],  
 [299, 272], [300, 15], [301, 150], [302, 418], [303, 393], [304, 143], [305, 348],  
 [306, 234], [307, 176], [308, 137], [309, 288], [310, 175], [311, 127], [312, 188],  
 [313, 257], [314, 406], [315, 273], [316, 25], [317, 250], [318, 336], [319, 114],  
 [320, 58], [321, 39], [322, 390], [323, 113], [324, 48], [325, 480], [326, 472],  
 [327, 392], [328, 133], [329, 248], [330, 316], [331, 455], [332, 222], [333, 56],  
 [334, 19], [335, 190], [336, 277], [337, 65], [338, 109], [339, 8], [340, 80],  
 [341, 259], [342, 426], [343, 473], [344, 402], [345, 233], [346, 166], [347, 37],  
 [348, 370], [349, 454], [350, 212], [351, 497], [352, 101], [353, 469], [354, 362],  
 [355, 374], [356, 494], [357, 71], [358, 169], [359, 67], [360, 129], [361, 208],  
 [362, 457], [363, 242], [364, 256], [365, 396], [366, 173], [367, 107], [368, 529],  
 [369, 421], [370, 423], [371, 443], [372, 102], [373, 479], [374, 462], [375, 292],  
 [376, 215], [377, 527], [378, 401], [379, 223], [380, 66], [381, 119], [382, 108],  
 [383, 539], [384, 521], [385, 341], [386, 164], [387, 17], [388, 170], [389, 77],  
 [390, 229], [391, 126], [392, 178], [393, 157], [394, 488], [395, 11], [396, 110],  
 [397, 18], [398, 180], [399, 177], [400, 147], [401, 388], [402, 93], [403, 389],  
 [404, 103], [405, 489], [406, 21], [407, 210], [408, 477], [409, 442], [410, 92],  
 [411, 379], [412, 3], [413, 30], [414, 300], [415, 295], [416, 245], [417, 286],  
 [418, 155], [419, 468], [420, 352], [421, 274], [422, 35], [423, 350], [424, 254],  
 [425, 376], [426, 514], [427, 271], [428, 5], [429, 50], [430, 500], [431, 131],  
 [432, 228], [433, 116], [434, 78], [435, 239], [436, 226], [437, 96], [438, 419],  
 [439, 403], [440, 243], [441, 266], [442, 496], [443, 91], [444, 369], [445, 444],  
 [446, 112], [447, 38], [448, 380], [449, 13], [450, 130], [451, 218], [452, 16],  
 [453, 160], [454, 518], [455, 311], [456, 405], [457, 263], [458, 466], [459, 332],  
 [460, 74], [461, 199], [462, 367], [463, 424], [464, 453], [465, 202], [466, 397],  
 [467, 183], [468, 207], [469, 447], [470, 142], [471, 338], [472, 134], [473, 258],  
 [474, 416], [475, 373], [476, 484], [477, 512], [478, 251], [479, 346], [480, 214],  
 [481, 517], [482, 301], [483, 305], [484, 345], [485, 204], [486, 417], [487, 383],  
 [488, 43], [489, 430], [490, 513], [491, 261], [492, 446], [493, 132], [494, 238],  
 [495, 216], [496, 537], [497, 501], [498, 141], [499, 328], [500, 34], [501, 340],  
 [502, 154], [503, 458], [504, 252], [505, 356], [506, 314], [507, 435], [508, 22],  
 [509, 220], [510, 36], [511, 360], [512, 354], [513, 294], [514, 235], [515, 186],  
 [516, 237], [517, 206], [518, 437], [519, 42], [520, 420], [521, 413], [522, 343],  
 [523, 184], [524, 217], [525, 6], [526, 60], [527, 59], [528, 49], [529, 490],  
 [530, 31], [531, 310], [532, 395], [533, 163], [534, 7], [535, 70], [536, 159],  
 [537, 508], [538, 211], [539, 487], [540, 1]

## Tables 6

Puissances de 11 modulo 541: Le premier chiffre représente l'exposant, autrement dit  $[78, 526]$  se lit  $11^{78} \equiv 526 \pmod{541}$

[1, 11], [2, 121], [3, 249], [4, 34], [5, 374], [6, 327], [7, 351], [8, 74], [9, 273], [10, 298], [11, 32], [12, 352], [13, 85], [14, 394], [15, 6], [16, 66], [17, 185], [18, 412], [19, 204], [20, 80], [21, 339], [22, 483], [23, 444], [24, 15], [25, 165], [26, 192], [27, 489], [28, 510], [29, 200], [30, 36], [31, 396], [32, 28], [33, 308], [34, 142], [35, 480], [36, 411], [37, 193], [38, 500], [39, 90], [40, 449], [41, 70], [42, 229], [43, 355], [44, 118], [45, 216], [46, 212], [47, 168], [48, 225], [49, 311], [50, 175], [51, 302], [52, 76], [53, 295], [54, 540], [55, 530], [56, 420], [57, 292], [58, 507], [59, 167], [60, 214], [61, 190], [62, 467], [63, 268], [64, 243], [65, 509], [66, 189], [67, 456], [68, 147], [69, 535], [70, 475], [71, 356], [72, 129], [73, 337], [74, 461], [75, 202], [76, 58], [77, 97], [78, 526], [79, 376], [80, 349], [81, 52], [82, 31], [83, 341], [84, 505], [85, 145], [86, 513], [87, 233], [88, 399], [89, 61], [90, 130], [91, 348], [92, 41], [93, 451], [94, 92], [95, 471], [96, 312], [97, 186], [98, 423], [99, 325], [100, 329], [101, 373], [102, 316], [103, 230], [104, 366], [105, 239], [106, 465], [107, 246], [108, 1], [109, 11], [110, 121], [111, 249], [112, 34], [113, 374], [114, 327], [115, 351], [116, 74], [117, 273], [118, 298], [119, 32], [120, 352], [121, 85], [122, 394], [123, 6], [124, 66], [125, 185], [126, 412], [127, 204], [128, 80], [129, 339], [130, 483], [131, 444], [132, 15], [133, 165], [134, 192], [135, 489], [136, 510], [137, 200], [138, 36], [139, 396], [140, 28], [141, 308], [142, 142], [143, 480], [144, 411], [145, 193], [146, 500], [147, 90], [148, 449], [149, 70], [150, 229], [151, 355], [152, 118], [153, 216], [154, 212], [155, 168], [156, 225], [157, 311], [158, 175], [159, 302], [160, 76], [161, 295], [162, 540], [163, 530], [164, 420], [165, 292], [166, 507], [167, 167], [168, 214], [169, 190], [170, 467], [171, 268], [172, 243], [173, 509], [174, 189], [175, 456], [176, 147], [177, 535], [178, 475], [179, 356], [180, 129], [181, 337], [182, 461], [183, 202], [184, 58], [185, 97], [186, 526], [187, 376], [188, 349], [189, 52], [190, 31], [191, 341], [192, 505], [193, 145], [194, 513], [195, 233], [196, 399], [197, 61], [198, 130], [199, 348], [200, 41], [201, 451], [202, 92], [203, 471], [204, 312], [205, 186], [206, 423], [207, 325], [208, 329], [209, 373], [210, 316], [211, 230], [212, 366], [213, 239], [214, 465], [215, 246], [216, 1], [217, 11], [218, 121], [219, 249], [220, 34], [221, 374], [222, 327], [223, 351], [224, 74], [225, 273], [226, 298], [227, 32], [228, 352], [229, 85], [230, 394], [231, 6], [232, 66], [233, 185], [234, 412], [235, 204], [236, 80], [237, 339], [238, 483], [239, 444], [240, 15], [241, 165], [242, 192], [243, 489], [244, 510], [245, 200], [246, 36], [247, 396], [248, 28], [249, 308], [250, 142], [251, 480], [252, 411], [253, 193], [254, 500], [255, 90], [256, 449], [257, 70], [258, 229], [259, 355], [260, 118], [261, 216], [262, 212], [263, 168], [264, 225], [265, 311], [266, 175], [267, 302], [268, 76], [269, 295], [270, 540],

[271, 530], [272, 420], [273, 292], [274, 507], [275, 167], [276, 214], [277, 190],  
[278, 467], [279, 268], [280, 243], [281, 509], [282, 189], [283, 456], [284, 147],  
[285, 535], [286, 475], [287, 356], [288, 129], [289, 337], [290, 461], [291, 202],  
[292, 58], [293, 97], [294, 526], [295, 376], [296, 349], [297, 52], [298, 31],  
[299, 341], [300, 505], [301, 145], [302, 513], [303, 233], [304, 399], [305, 61],  
[306, 130], [307, 348], [308, 41], [309, 451], [310, 92], [311, 471], [312, 312],  
[313, 186], [314, 423], [315, 325], [316, 329], [317, 373], [318, 316], [319, 230],  
[320, 366], [321, 239], [322, 465], [323, 246], [324, 1], [325, 11], [326, 121],  
[327, 249], [328, 34], [329, 374], [330, 327], [331, 351], [332, 74], [333, 273],  
[334, 298], [335, 32], [336, 352], [337, 85], [338, 394], [339, 6], [340, 66],  
[341, 185], [342, 412], [343, 204], [344, 80], [345, 339], [346, 483], [347, 444],  
[348, 15], [349, 165], [350, 192], [351, 489], [352, 510], [353, 200], [354, 36],  
[355, 396], [356, 28], [357, 308], [358, 142], [359, 480], [360, 411], [361, 193],  
[362, 500], [363, 90], [364, 449], [365, 70], [366, 229], [367, 355], [368, 118],  
[369, 216], [370, 212], [371, 168], [372, 225], [373, 311], [374, 175], [375, 302],  
[376, 76], [377, 295], [378, 540], [379, 530], [380, 420], [381, 292], [382, 507],  
[383, 167], [384, 214], [385, 190], [386, 467], [387, 268], [388, 243], [389, 509],  
[390, 189], [391, 456], [392, 147], [393, 535], [394, 475], [395, 356], [396, 129],  
[397, 337], [398, 461], [399, 202], [400, 58], [401, 97], [402, 526], [403, 376],  
[404, 349], [405, 52], [406, 31], [407, 341], [408, 505], [409, 145], [410, 513],  
[411, 233], [412, 399], [413, 61], [414, 130], [415, 348], [416, 41], [417, 451],  
[418, 92], [419, 471], [420, 312], [421, 186], [422, 423], [423, 325], [424, 329],  
[425, 373], [426, 316], [427, 230], [428, 366], [429, 239], [430, 465], [431, 246],  
[432, 1], [433, 11], [434, 121], [435, 249], [436, 34], [437, 374], [438, 327],  
[439, 351], [440, 74], [441, 273], [442, 298], [443, 32], [444, 352], [445, 85],  
[446, 394], [447, 6], [448, 66], [449, 185], [450, 412], [451, 204], [452, 80],  
[453, 339], [454, 483], [455, 444], [456, 15], [457, 165], [458, 192], [459, 489],  
[460, 510], [461, 200], [462, 36], [463, 396], [464, 28], [465, 308], [466, 142],  
[467, 480], [468, 411], [469, 193], [470, 500], [471, 90], [472, 449], [473, 70],  
[474, 229], [475, 355], [476, 118], [477, 216], [478, 212], [479, 168], [480, 225],  
[481, 311], [482, 175], [483, 302], [484, 76], [485, 295], [486, 540], [487, 530],  
[488, 420], [489, 292], [490, 507], [491, 167], [492, 214], [493, 190], [494, 467],  
[495, 268], [496, 243], [497, 509], [498, 189], [499, 456], [500, 147], [501, 535],  
[502, 475], [503, 356], [504, 129], [505, 337], [506, 461], [507, 202], [508, 58],  
[509, 97], [510, 526], [511, 376], [512, 349], [513, 52], [514, 31], [515, 341],  
[516, 505], [517, 145], [518, 513], [519, 233], [520, 399], [521, 61], [522, 130],  
[523, 348], [524, 41], [525, 451], [526, 92], [527, 471], [528, 312], [529, 186],  
[530, 423], [531, 325], [532, 329], [533, 373], [534, 316], [535, 230], [536, 366],  
[537, 239], [538, 465], [539, 246], [540, 1]

## Tables 7

Puissances de 2 modulo 503: Le premier chiffre représente l'exposant, autrement dit  $[78, 293]$  se lit  $2^{78} \equiv 293 \pmod{503}$

[1, 2], [2, 4], [3, 8], [4, 16], [5, 32], [6, 64], [7, 128], [8, 256], [9, 9], [10, 18],  
[11, 36], [12, 72], [13, 144], [14, 288], [15, 73], [16, 146], [17, 292], [18, 81],  
[19, 162], [20, 324], [21, 145], [22, 290], [23, 77], [24, 154], [25, 308], [26, 113],  
[27, 226], [28, 452], [29, 401], [30, 299], [31, 95], [32, 190], [33, 380], [34, 257],  
[35, 11], [36, 22], [37, 44], [38, 88], [39, 176], [40, 352], [41, 201], [42, 402],  
[43, 301], [44, 99], [45, 198], [46, 396], [47, 289], [48, 75], [49, 150], [50, 300],  
[51, 97], [52, 194], [53, 388], [54, 273], [55, 43], [56, 86], [57, 172], [58, 344],  
[59, 185], [60, 370], [61, 237], [62, 474], [63, 445], [64, 387], [65, 271], [66, 39],  
[67, 78], [68, 156], [69, 312], [70, 121], [71, 242], [72, 484], [73, 465], [74, 427],  
[75, 351], [76, 199], [77, 398], [78, 293], [79, 83], [80, 166], [81, 332], [82, 161],  
[83, 322], [84, 141], [85, 282], [86, 61], [87, 122], [88, 244], [89, 488], [90, 473],  
[91, 443], [92, 383], [93, 263], [94, 23], [95, 46], [96, 92], [97, 184], [98, 368],  
[99, 233], [100, 466], [101, 429], [102, 355], [103, 207], [104, 414], [105, 325],  
[106, 147], [107, 294], [108, 85], [109, 170], [110, 340], [111, 177], [112, 354],  
[113, 205], [114, 410], [115, 317], [116, 131], [117, 262], [118, 21], [119, 42],  
[120, 84], [121, 168], [122, 336], [123, 169], [124, 338], [125, 173], [126, 346],  
[127, 189], [128, 378], [129, 253], [130, 3], [131, 6], [132, 12], [133, 24], [134, 48],  
[135, 96], [136, 192], [137, 384], [138, 265], [139, 27], [140, 54], [141, 108],  
[142, 216], [143, 432], [144, 361], [145, 219], [146, 438], [147, 373], [148, 243],  
[149, 486], [150, 469], [151, 435], [152, 367], [153, 231], [154, 462], [155, 421],  
[156, 339], [157, 175], [158, 350], [159, 197], [160, 394], [161, 285], [162, 67],  
[163, 134], [164, 268], [165, 33], [166, 66], [167, 132], [168, 264], [169, 25],  
[170, 50], [171, 100], [172, 200], [173, 400], [174, 297], [175, 91], [176, 182],  
[177, 364], [178, 225], [179, 450], [180, 397], [181, 291], [182, 79], [183, 158],  
[184, 316], [185, 129], [186, 258], [187, 13], [188, 26], [189, 52], [190, 104],  
[191, 208], [192, 416], [193, 329], [194, 155], [195, 310], [196, 117], [197, 234],  
[198, 468], [199, 433], [200, 363], [201, 223], [202, 446], [203, 389], [204, 275],  
[205, 47], [206, 94], [207, 188], [208, 376], [209, 249], [210, 498], [211, 493],  
[212, 483], [213, 463], [214, 423], [215, 343], [216, 183], [217, 366], [218, 229],  
[219, 458], [220, 413], [221, 323], [222, 143], [223, 286], [224, 69], [225, 138],  
[226, 276], [227, 49], [228, 98], [229, 196], [230, 392], [231, 281], [232, 59],  
[233, 118], [234, 236], [235, 472], [236, 441], [237, 379], [238, 255], [239, 7],  
[240, 14], [241, 28], [242, 56], [243, 112], [244, 224], [245, 448], [246, 393],  
[247, 283], [248, 63], [249, 126], [250, 252], [251, 1],

[252, 2], [253, 4], [254, 8], [255, 16], [256, 32], [257, 64], [258, 128], [259, 256],  
[260, 9], [261, 18], [262, 36], [263, 72], [264, 144], [265, 288], [266, 73],  
[267, 146], [268, 292], [269, 81], [270, 162], [271, 324], [272, 145], [273, 290],  
[274, 77], [275, 154], [276, 308], [277, 113], [278, 226], [279, 452], [280, 401],  
[281, 299], [282, 95], [283, 190], [284, 380], [285, 257], [286, 11], [287, 22],  
[288, 44], [289, 88], [290, 176], [291, 352], [292, 201], [293, 402], [294, 301],  
[295, 99], [296, 198], [297, 396], [298, 289], [299, 75], [300, 150], [301, 300],  
[302, 97], [303, 194], [304, 388], [305, 273], [306, 43], [307, 86], [308, 172],  
[309, 344], [310, 185], [311, 370], [312, 237], [313, 474], [314, 445], [315, 387],  
[316, 271], [317, 39], [318, 78], [319, 156], [320, 312], [321, 121], [322, 242],  
[323, 484], [324, 465], [325, 427], [326, 351], [327, 199], [328, 398], [329, 293],  
[330, 83], [331, 166], [332, 332], [333, 161], [334, 322], [335, 141], [336, 282],  
[337, 61], [338, 122], [339, 244], [340, 488], [341, 473], [342, 443], [343, 383],  
[344, 263], [345, 23], [346, 46], [347, 92], [348, 184], [349, 368], [350, 233],  
[351, 466], [352, 429], [353, 355], [354, 207], [355, 414], [356, 325], [357, 147],  
[358, 294], [359, 85], [360, 170], [361, 340], [362, 177], [363, 354], [364, 205],  
[365, 410], [366, 317], [367, 131], [368, 262], [369, 21], [370, 42], [371, 84],  
[372, 168], [373, 336], [374, 169], [375, 338], [376, 173], [377, 346], [378, 189],  
[379, 378], [380, 253], [381, 3], [382, 6], [383, 12], [384, 24], [385, 48], [386, 96],  
[387, 192], [388, 384], [389, 265], [390, 27], [391, 54], [392, 108], [393, 216],  
[394, 432], [395, 361], [396, 219], [397, 438], [398, 373], [399, 243], [400, 486],  
[401, 469], [402, 435], [403, 367], [404, 231], [405, 462], [406, 421], [407, 339],  
[408, 175], [409, 350], [410, 197], [411, 394], [412, 285], [413, 67], [414, 134],  
[415, 268], [416, 33], [417, 66], [418, 132], [419, 264], [420, 25], [421, 50],  
[422, 100], [423, 200], [424, 400], [425, 297], [426, 91], [427, 182], [428, 364],  
[429, 225], [430, 450], [431, 397], [432, 291], [433, 79], [434, 158], [435, 316],  
[436, 129], [437, 258], [438, 13], [439, 26], [440, 52], [441, 104], [442, 208],  
[443, 416], [444, 329], [445, 155], [446, 310], [447, 117], [448, 234], [449, 468],  
[450, 433], [451, 363], [452, 223], [453, 446], [454, 389], [455, 275], [456, 47],  
[457, 94], [458, 188], [459, 376], [460, 249], [461, 498], [462, 493], [463, 483],  
[464, 463], [465, 423], [466, 343], [467, 183], [468, 366], [469, 229], [470, 458],  
[471, 413], [472, 323], [473, 143], [474, 286], [475, 69], [476, 138], [477, 276],  
[478, 49], [479, 98], [480, 196], [481, 392], [482, 281], [483, 59], [484, 118],  
[485, 236], [486, 472], [487, 441], [488, 379], [489, 255], [490, 7], [491, 14],  
[492, 28], [493, 56], [494, 112], [495, 224], [496, 448], [497, 393], [498, 283],  
[499, 63], [500, 126], [501, 252], [502, 1]

## Tables 8

Puissances de 3 modulo 503: Le premier chiffre représente l'exposant, autrement dit  $[78, 466]$  se lit  $3^{78} \equiv 466 \pmod{503}$

[1, 3], [2, 9], [3, 27], [4, 81], [5, 243], [6, 226], [7, 175], [8, 22], [9, 66], [10, 198], [11, 91], [12, 273], [13, 316], [14, 445], [15, 329], [16, 484], [17, 446], [18, 332], [19, 493], [20, 473], [21, 413], [22, 233], [23, 196], [24, 85], [25, 255], [26, 262], [27, 283], [28, 346], [29, 32], [30, 96], [31, 288], [32, 361], [33, 77], [34, 231], [35, 190], [36, 67], [37, 201], [38, 100], [39, 300], [40, 397], [41, 185], [42, 52], [43, 156], [44, 468], [45, 398], [46, 188], [47, 61], [48, 183], [49, 46], [50, 138], [51, 414], [52, 236], [53, 205], [54, 112], [55, 336], [56, 2], [57, 6], [58, 18], [59, 54], [60, 162], [61, 486], [62, 452], [63, 350], [64, 44], [65, 132], [66, 396], [67, 182], [68, 43], [69, 129], [70, 387], [71, 155], [72, 465], [73, 389], [74, 161], [75, 483], [76, 443], [77, 323], [78, 466], [79, 392], [80, 170], [81, 7], [82, 21], [83, 63], [84, 189], [85, 64], [86, 192], [87, 73], [88, 219], [89, 154], [90, 462], [91, 380], [92, 134], [93, 402], [94, 200], [95, 97], [96, 291], [97, 370], [98, 104], [99, 312], [100, 433], [101, 293], [102, 376], [103, 122], [104, 366], [105, 92], [106, 276], [107, 325], [108, 472], [109, 410], [110, 224], [111, 169], [112, 4], [113, 12], [114, 36], [115, 108], [116, 324], [117, 469], [118, 401], [119, 197], [120, 88], [121, 264], [122, 289], [123, 364], [124, 86], [125, 258], [126, 271], [127, 310], [128, 427], [129, 275], [130, 322], [131, 463], [132, 383], [133, 143], [134, 429], [135, 281], [136, 340], [137, 14], [138, 42], [139, 126], [140, 378], [141, 128], [142, 384], [143, 146], [144, 438], [145, 308], [146, 421], [147, 257], [148, 268], [149, 301], [150, 400], [151, 194], [152, 79], [153, 237], [154, 208], [155, 121], [156, 363], [157, 83], [158, 249], [159, 244], [160, 229], [161, 184], [162, 49], [163, 147], [164, 441], [165, 317], [166, 448], [167, 338], [168, 8], [169, 24], [170, 72], [171, 216], [172, 145], [173, 435], [174, 299], [175, 394], [176, 176], [177, 25], [178, 75], [179, 225], [180, 172], [181, 13], [182, 39], [183, 117], [184, 351], [185, 47], [186, 141], [187, 423], [188, 263], [189, 286], [190, 355], [191, 59], [192, 177], [193, 28], [194, 84], [195, 252], [196, 253], [197, 256], [198, 265], [199, 292], [200, 373], [201, 113], [202, 339], [203, 11], [204, 33], [205, 99], [206, 297], [207, 388], [208, 158], [209, 474], [210, 416], [211, 242], [212, 223], [213, 166], [214, 498], [215, 488], [216, 458], [217, 368], [218, 98], [219, 294], [220, 379], [221, 131], [222, 393], [223, 173], [224, 16], [225, 48], [226, 144], [227, 432], [228, 290], [229, 367], [230, 95], [231, 285], [232, 352], [233, 50], [234, 150], [235, 450], [236, 344], [237, 26], [238, 78], [239, 234], [240, 199], [241, 94], [242, 282], [243, 343], [244, 23], [245, 69], [246, 207], [247, 118], [248, 354], [249, 56], [250, 168], [251, 1],

[252, 3], [253, 9], [254, 27], [255, 81], [256, 243], [257, 226], [258, 175], [259, 22],  
[260, 66], [261, 198], [262, 91], [263, 273], [264, 316], [265, 445], [266, 329],  
[267, 484], [268, 446], [269, 332], [270, 493], [271, 473], [272, 413], [273, 233],  
[274, 196], [275, 85], [276, 255], [277, 262], [278, 283], [279, 346], [280, 32],  
[281, 96], [282, 288], [283, 361], [284, 77], [285, 231], [286, 190], [287, 67],  
[288, 201], [289, 100], [290, 300], [291, 397], [292, 185], [293, 52], [294, 156],  
[295, 468], [296, 398], [297, 188], [298, 61], [299, 183], [300, 46], [301, 138],  
[302, 414], [303, 236], [304, 205], [305, 112], [306, 336], [307, 2], [308, 6],  
[309, 18], [310, 54], [311, 162], [312, 486], [313, 452], [314, 350], [315, 44],  
[316, 132], [317, 396], [318, 182], [319, 43], [320, 129], [321, 387], [322, 155],  
[323, 465], [324, 389], [325, 161], [326, 483], [327, 443], [328, 323], [329, 466],  
[330, 392], [331, 170], [332, 7], [333, 21], [334, 63], [335, 189], [336, 64],  
[337, 192], [338, 73], [339, 219], [340, 154], [341, 462], [342, 380], [343, 134],  
[344, 402], [345, 200], [346, 97], [347, 291], [348, 370], [349, 104], [350, 312],  
[351, 433], [352, 293], [353, 376], [354, 122], [355, 366], [356, 92], [357, 276],  
[358, 325], [359, 472], [360, 410], [361, 224], [362, 169], [363, 4], [364, 12],  
[365, 36], [366, 108], [367, 324], [368, 469], [369, 401], [370, 197], [371, 88],  
[372, 264], [373, 289], [374, 364], [375, 86], [376, 258], [377, 271], [378, 310],  
[379, 427], [380, 275], [381, 322], [382, 463], [383, 383], [384, 143], [385, 429],  
[386, 281], [387, 340], [388, 14], [389, 42], [390, 126], [391, 378], [392, 128],  
[393, 384], [394, 146], [395, 438], [396, 308], [397, 421], [398, 257], [399, 268],  
[400, 301], [401, 400], [402, 194], [403, 79], [404, 237], [405, 208], [406, 121],  
[407, 363], [408, 83], [409, 249], [410, 244], [411, 229], [412, 184], [413, 49],  
[414, 147], [415, 441], [416, 317], [417, 448], [418, 338], [419, 8], [420, 24],  
[421, 72], [422, 216], [423, 145], [424, 435], [425, 299], [426, 394], [427, 176],  
[428, 25], [429, 75], [430, 225], [431, 172], [432, 13], [433, 39], [434, 117],  
[435, 351], [436, 47], [437, 141], [438, 423], [439, 263], [440, 286], [441, 355],  
[442, 59], [443, 177], [444, 28], [445, 84], [446, 252], [447, 253], [448, 256],  
[449, 265], [450, 292], [451, 373], [452, 113], [453, 339], [454, 11], [455, 33],  
[456, 99], [457, 297], [458, 388], [459, 158], [460, 474], [461, 416], [462, 242],  
[463, 223], [464, 166], [465, 498], [466, 488], [467, 458], [468, 368], [469, 98],  
[470, 294], [471, 379], [472, 131], [473, 393], [474, 173], [475, 16], [476, 48],  
[477, 144], [478, 432], [479, 290], [480, 367], [481, 95], [482, 285], [483, 352],  
[484, 50], [485, 150], [486, 450], [487, 344], [488, 26], [489, 78], [490, 234],  
[491, 199], [492, 94], [493, 282], [494, 343], [495, 23], [496, 69], [497, 207],  
[498, 118], [499, 354], [500, 56], [501, 168], [502, 1]

## Tables 9

Puissances de 4 modulo 503: Le premier chiffre représente l'exposant, autrement dit  $[78, 339]$  se lit  $4^{78} \equiv 339 \pmod{503}$

[1, 4], [2, 16], [3, 64], [4, 256], [5, 18], [6, 72], [7, 288], [8, 146], [9, 81],  
[10, 324], [11, 290], [12, 154], [13, 113], [14, 452], [15, 299], [16, 190], [17, 257],  
[18, 22], [19, 88], [20, 352], [21, 402], [22, 99], [23, 396], [24, 75], [25, 300],  
[26, 194], [27, 273], [28, 86], [29, 344], [30, 370], [31, 474], [32, 387], [33, 39],  
[34, 156], [35, 121], [36, 484], [37, 427], [38, 199], [39, 293], [40, 166], [41, 161],  
[42, 141], [43, 61], [44, 244], [45, 473], [46, 383], [47, 23], [48, 92], [49, 368],  
[50, 466], [51, 355], [52, 414], [53, 147], [54, 85], [55, 340], [56, 354], [57, 410],  
[58, 131], [59, 21], [60, 84], [61, 336], [62, 338], [63, 346], [64, 378], [65, 3],  
[66, 12], [67, 48], [68, 192], [69, 265], [70, 54], [71, 216], [72, 361], [73, 438],  
[74, 243], [75, 469], [76, 367], [77, 462], [78, 339], [79, 350], [80, 394], [81, 67],  
[82, 268], [83, 66], [84, 264], [85, 50], [86, 200], [87, 297], [88, 182], [89, 225],  
[90, 397], [91, 79], [92, 316], [93, 258], [94, 26], [95, 104], [96, 416], [97, 155],  
[98, 117], [99, 468], [100, 363], [101, 446], [102, 275], [103, 94], [104, 376],  
[105, 498], [106, 483], [107, 423], [108, 183], [109, 229], [110, 413], [111, 143],  
[112, 69], [113, 276], [114, 98], [115, 392], [116, 59], [117, 236], [118, 441],  
[119, 255], [120, 14], [121, 56], [122, 224], [123, 393], [124, 63], [125, 252],  
[126, 2], [127, 8], [128, 32], [129, 128], [130, 9], [131, 36], [132, 144], [133, 73],  
[134, 292], [135, 162], [136, 145], [137, 77], [138, 308], [139, 226], [140, 401],  
[141, 95], [142, 380], [143, 11], [144, 44], [145, 176], [146, 201], [147, 301],  
[148, 198], [149, 289], [150, 150], [151, 97], [152, 388], [153, 43], [154, 172],  
[155, 185], [156, 237], [157, 445], [158, 271], [159, 78], [160, 312], [161, 242],  
[162, 465], [163, 351], [164, 398], [165, 83], [166, 332], [167, 322], [168, 282],  
[169, 122], [170, 488], [171, 443], [172, 263], [173, 46], [174, 184], [175, 233],  
[176, 429], [177, 207], [178, 325], [179, 294], [180, 170], [181, 177], [182, 205],  
[183, 317], [184, 262], [185, 42], [186, 168], [187, 169], [188, 173], [189, 189],  
[190, 253], [191, 6], [192, 24], [193, 96], [194, 384], [195, 27], [196, 108],  
[197, 432], [198, 219], [199, 373], [200, 486], [201, 435], [202, 231], [203, 421],  
[204, 175], [205, 197], [206, 285], [207, 134], [208, 33], [209, 132], [210, 25],  
[211, 100], [212, 400], [213, 91], [214, 364], [215, 450], [216, 291], [217, 158],  
[218, 129], [219, 13], [220, 52], [221, 208], [222, 329], [223, 310], [224, 234],  
[225, 433], [226, 223], [227, 389], [228, 47], [229, 188], [230, 249], [231, 493],  
[232, 463], [233, 343], [234, 366], [235, 458], [236, 323], [237, 286], [238, 138],  
[239, 49], [240, 196], [241, 281], [242, 118], [243, 472], [244, 379], [245, 7],  
[246, 28], [247, 112], [248, 448], [249, 283], [250, 126], [251, 1],

[252, 4], [253, 16], [254, 64], [255, 256], [256, 18], [257, 72], [258, 288],  
[259, 146], [260, 81], [261, 324], [262, 290], [263, 154], [264, 113], [265, 452],  
[266, 299], [267, 190], [268, 257], [269, 22], [270, 88], [271, 352], [272, 402],  
[273, 99], [274, 396], [275, 75], [276, 300], [277, 194], [278, 273], [279, 86],  
[280, 344], [281, 370], [282, 474], [283, 387], [284, 39], [285, 156], [286, 121],  
[287, 484], [288, 427], [289, 199], [290, 293], [291, 166], [292, 161], [293, 141],  
[294, 61], [295, 244], [296, 473], [297, 383], [298, 23], [299, 92], [300, 368],  
[301, 466], [302, 355], [303, 414], [304, 147], [305, 85], [306, 340], [307, 354],  
[308, 410], [309, 131], [310, 21], [311, 84], [312, 336], [313, 338], [314, 346],  
[315, 378], [316, 3], [317, 12], [318, 48], [319, 192], [320, 265], [321, 54],  
[322, 216], [323, 361], [324, 438], [325, 243], [326, 469], [327, 367], [328, 462],  
[329, 339], [330, 350], [331, 394], [332, 67], [333, 268], [334, 66], [335, 264],  
[336, 50], [337, 200], [338, 297], [339, 182], [340, 225], [341, 397], [342, 79],  
[343, 316], [344, 258], [345, 26], [346, 104], [347, 416], [348, 155], [349, 117],  
[350, 468], [351, 363], [352, 446], [353, 275], [354, 94], [355, 376], [356, 498],  
[357, 483], [358, 423], [359, 183], [360, 229], [361, 413], [362, 143], [363, 69],  
[364, 276], [365, 98], [366, 392], [367, 59], [368, 236], [369, 441], [370, 255],  
[371, 14], [372, 56], [373, 224], [374, 393], [375, 63], [376, 252], [377, 2],  
[378, 8], [379, 32], [380, 128], [381, 9], [382, 36], [383, 144], [384, 73], [385, 292],  
[386, 162], [387, 145], [388, 77], [389, 308], [390, 226], [391, 401], [392, 95],  
[393, 380], [394, 11], [395, 44], [396, 176], [397, 201], [398, 301], [399, 198],  
[400, 289], [401, 150], [402, 97], [403, 388], [404, 43], [405, 172], [406, 185],  
[407, 237], [408, 445], [409, 271], [410, 78], [411, 312], [412, 242], [413, 465],  
[414, 351], [415, 398], [416, 83], [417, 332], [418, 322], [419, 282], [420, 122],  
[421, 488], [422, 443], [423, 263], [424, 46], [425, 184], [426, 233], [427, 429],  
[428, 207], [429, 325], [430, 294], [431, 170], [432, 177], [433, 205], [434, 317],  
[435, 262], [436, 42], [437, 168], [438, 169], [439, 173], [440, 189], [441, 253],  
[442, 6], [443, 24], [444, 96], [445, 384], [446, 27], [447, 108], [448, 432],  
[449, 219], [450, 373], [451, 486], [452, 435], [453, 231], [454, 421], [455, 175],  
[456, 197], [457, 285], [458, 134], [459, 33], [460, 132], [461, 25], [462, 100],  
[463, 400], [464, 91], [465, 364], [466, 450], [467, 291], [468, 158], [469, 129],  
[470, 13], [471, 52], [472, 208], [473, 329], [474, 310], [475, 234], [476, 433],  
[477, 223], [478, 389], [479, 47], [480, 188], [481, 249], [482, 493], [483, 463],  
[484, 343], [485, 366], [486, 458], [487, 323], [488, 286], [489, 138], [490, 49],  
[491, 196], [492, 281], [493, 118], [494, 472], [495, 379], [496, 7], [497, 28],  
[498, 112], [499, 448], [500, 283], [501, 126], [502, 1]

## Tables 10

Puissances de 5 modulo 503: Le premier chiffre représente l'exposant, autrement dit  $[78, 271]$  se lit  $5^{78} \equiv 271 \pmod{503}$

[1, 5], [2, 25], [3, 125], [4, 122], [5, 107], [6, 32], [7, 160], [8, 297], [9, 479],  
[10, 383], [11, 406], [12, 18], [13, 90], [14, 450], [15, 238], [16, 184], [17, 417],  
[18, 73], [19, 365], [20, 316], [21, 71], [22, 355], [23, 266], [24, 324], [25, 111],  
[26, 52], [27, 260], [28, 294], [29, 464], [30, 308], [31, 31], [32, 155], [33, 272],  
[34, 354], [35, 261], [36, 299], [37, 489], [38, 433], [39, 153], [40, 262], [41, 304],  
[42, 11], [43, 55], [44, 275], [45, 369], [46, 336], [47, 171], [48, 352], [49, 251],  
[50, 249], [51, 239], [52, 189], [53, 442], [54, 198], [55, 487], [56, 423], [57, 103],  
[58, 12], [59, 60], [60, 300], [61, 494], [62, 458], [63, 278], [64, 384], [65, 411],  
[66, 43], [67, 215], [68, 69], [69, 345], [70, 216], [71, 74], [72, 370], [73, 341],  
[74, 196], [75, 477], [76, 373], [77, 356], [78, 271], [79, 349], [80, 236], [81, 174],  
[82, 367], [83, 326], [84, 121], [85, 102], [86, 7], [87, 35], [88, 175], [89, 372],  
[90, 351], [91, 246], [92, 224], [93, 114], [94, 67], [95, 335], [96, 166], [97, 327],  
[98, 126], [99, 127], [100, 132], [101, 157], [102, 282], [103, 404], [104, 8],  
[105, 40], [106, 200], [107, 497], [108, 473], [109, 353], [110, 256], [111, 274],  
[112, 364], [113, 311], [114, 46], [115, 230], [116, 144], [117, 217], [118, 79],  
[119, 395], [120, 466], [121, 318], [122, 81], [123, 405], [124, 13], [125, 65],  
[126, 325], [127, 116], [128, 77], [129, 385], [130, 416], [131, 68], [132, 340],  
[133, 191], [134, 452], [135, 248], [136, 234], [137, 164], [138, 317], [139, 76],  
[140, 380], [141, 391], [142, 446], [143, 218], [144, 84], [145, 420], [146, 88],  
[147, 440], [148, 188], [149, 437], [150, 173], [151, 362], [152, 301], [153, 499],  
[154, 483], [155, 403], [156, 3], [157, 15], [158, 75], [159, 375], [160, 366],  
[161, 321], [162, 96], [163, 480], [164, 388], [165, 431], [166, 143], [167, 212],  
[168, 54], [169, 270], [170, 344], [171, 211], [172, 49], [173, 245], [174, 219],  
[175, 89], [176, 445], [177, 213], [178, 59], [179, 295], [180, 469], [181, 333],  
[182, 156], [183, 277], [184, 379], [185, 386], [186, 421], [187, 93], [188, 465],  
[189, 313], [190, 56], [191, 280], [192, 394], [193, 461], [194, 293], [195, 459],  
[196, 283], [197, 409], [198, 33], [199, 165], [200, 322], [201, 101], [202, 2],  
[203, 10], [204, 50], [205, 250], [206, 244], [207, 214], [208, 64], [209, 320],  
[210, 91], [211, 455], [212, 263], [213, 309], [214, 36], [215, 180], [216, 397],  
[217, 476], [218, 368], [219, 331], [220, 146], [221, 227], [222, 129], [223, 142],  
[224, 207], [225, 29], [226, 145], [227, 222], [228, 104], [229, 17], [230, 85],  
[231, 425], [232, 113], [233, 62], [234, 310], [235, 41], [236, 205], [237, 19],  
[238, 95], [239, 475], [240, 363], [241, 306], [242, 21], [243, 105], [244, 22],  
[245, 110], [246, 47], [247, 235], [248, 169], [249, 342], [250, 201], [251, 502],

[252, 498], [253, 478], [254, 378], [255, 381], [256, 396], [257, 471], [258, 343],  
[259, 206], [260, 24], [261, 120], [262, 97], [263, 485], [264, 413], [265, 53],  
[266, 265], [267, 319], [268, 86], [269, 430], [270, 138], [271, 187], [272, 432],  
[273, 148], [274, 237], [275, 179], [276, 392], [277, 451], [278, 243], [279, 209],  
[280, 39], [281, 195], [282, 472], [283, 348], [284, 231], [285, 149], [286, 242],  
[287, 204], [288, 14], [289, 70], [290, 350], [291, 241], [292, 199], [293, 492],  
[294, 448], [295, 228], [296, 134], [297, 167], [298, 332], [299, 151], [300, 252],  
[301, 254], [302, 264], [303, 314], [304, 61], [305, 305], [306, 16], [307, 80],  
[308, 400], [309, 491], [310, 443], [311, 203], [312, 9], [313, 45], [314, 225],  
[315, 119], [316, 92], [317, 460], [318, 288], [319, 434], [320, 158], [321, 287],  
[322, 429], [323, 133], [324, 162], [325, 307], [326, 26], [327, 130], [328, 147],  
[329, 232], [330, 154], [331, 267], [332, 329], [333, 136], [334, 177], [335, 382],  
[336, 401], [337, 496], [338, 468], [339, 328], [340, 131], [341, 152], [342, 257],  
[343, 279], [344, 389], [345, 436], [346, 168], [347, 337], [348, 176], [349, 377],  
[350, 376], [351, 371], [352, 346], [353, 221], [354, 99], [355, 495], [356, 463],  
[357, 303], [358, 6], [359, 30], [360, 150], [361, 247], [362, 229], [363, 139],  
[364, 192], [365, 457], [366, 273], [367, 359], [368, 286], [369, 424], [370, 108],  
[371, 37], [372, 185], [373, 422], [374, 98], [375, 490], [376, 438], [377, 178],  
[378, 387], [379, 426], [380, 118], [381, 87], [382, 435], [383, 163], [384, 312],  
[385, 51], [386, 255], [387, 269], [388, 339], [389, 186], [390, 427], [391, 123],  
[392, 112], [393, 57], [394, 285], [395, 419], [396, 83], [397, 415], [398, 63],  
[399, 315], [400, 66], [401, 330], [402, 141], [403, 202], [404, 4], [405, 20],  
[406, 100], [407, 500], [408, 488], [409, 428], [410, 128], [411, 137], [412, 182],  
[413, 407], [414, 23], [415, 115], [416, 72], [417, 360], [418, 291], [419, 449],  
[420, 233], [421, 159], [422, 292], [423, 454], [424, 258], [425, 284], [426, 414],  
[427, 58], [428, 290], [429, 444], [430, 208], [431, 34], [432, 170], [433, 347],  
[434, 226], [435, 124], [436, 117], [437, 82], [438, 410], [439, 38], [440, 190],  
[441, 447], [442, 223], [443, 109], [444, 42], [445, 210], [446, 44], [447, 220],  
[448, 94], [449, 470], [450, 338], [451, 181], [452, 402], [453, 501], [454, 493],  
[455, 453], [456, 253], [457, 259], [458, 289], [459, 439], [460, 183], [461, 412],  
[462, 48], [463, 240], [464, 194], [465, 467], [466, 323], [467, 106], [468, 27],  
[469, 135], [470, 172], [471, 357], [472, 276], [473, 374], [474, 361], [475, 296],  
[476, 474], [477, 358], [478, 281], [479, 399], [480, 486], [481, 418], [482, 78],  
[483, 390], [484, 441], [485, 193], [486, 462], [487, 298], [488, 484], [489, 408],  
[490, 28], [491, 140], [492, 197], [493, 482], [494, 398], [495, 481], [496, 393],  
[497, 456], [498, 268], [499, 334], [500, 161], [501, 302], [502, 1]

## Tables 11

Puissances de 6 modulo 503: Le premier chiffre représente l'exposant, autrement dit  $[78, 225]$  se lit  $6^{78} \equiv 225 \pmod{503}$

[1, 6], [2, 36], [3, 216], [4, 290], [5, 231], [6, 380], [7, 268], [8, 99], [9, 91], [10, 43],  
 [11, 258], [12, 39], [13, 234], [14, 398], [15, 376], [16, 244], [17, 458], [18, 233],  
 [19, 392], [20, 340], [21, 28], [22, 168], [23, 2], [24, 12], [25, 72], [26, 432],  
 [27, 77], [28, 462], [29, 257], [30, 33], [31, 198], [32, 182], [33, 86], [34, 13],  
 [35, 78], [36, 468], [37, 293], [38, 249], [39, 488], [40, 413], [41, 466], [42, 281],  
 [43, 177], [44, 56], [45, 336], [46, 4], [47, 24], [48, 144], [49, 361], [50, 154],  
 [51, 421], [52, 11], [53, 66], [54, 396], [55, 364], [56, 172], [57, 26], [58, 156],  
 [59, 433], [60, 83], [61, 498], [62, 473], [63, 323], [64, 429], [65, 59], [66, 354],  
 [67, 112], [68, 169], [69, 8], [70, 48], [71, 288], [72, 219], [73, 308], [74, 339],  
 [75, 22], [76, 132], [77, 289], [78, 225], [79, 344], [80, 52], [81, 312], [82, 363],  
 [83, 166], [84, 493], [85, 443], [86, 143], [87, 355], [88, 118], [89, 205], [90, 224],  
 [91, 338], [92, 16], [93, 96], [94, 73], [95, 438], [96, 113], [97, 175], [98, 44],  
 [99, 264], [100, 75], [101, 450], [102, 185], [103, 104], [104, 121], [105, 223],  
 [106, 332], [107, 483], [108, 383], [109, 286], [110, 207], [111, 236], [112, 410],  
 [113, 448], [114, 173], [115, 32], [116, 192], [117, 146], [118, 373], [119, 226],  
 [120, 350], [121, 88], [122, 25], [123, 150], [124, 397], [125, 370], [126, 208],  
 [127, 242], [128, 446], [129, 161], [130, 463], [131, 263], [132, 69], [133, 414],  
 [134, 472], [135, 317], [136, 393], [137, 346], [138, 64], [139, 384], [140, 292],  
 [141, 243], [142, 452], [143, 197], [144, 176], [145, 50], [146, 300], [147, 291],  
 [148, 237], [149, 416], [150, 484], [151, 389], [152, 322], [153, 423], [154, 23],  
 [155, 138], [156, 325], [157, 441], [158, 131], [159, 283], [160, 189], [161, 128],  
 [162, 265], [163, 81], [164, 486], [165, 401], [166, 394], [167, 352], [168, 100],  
 [169, 97], [170, 79], [171, 474], [172, 329], [173, 465], [174, 275], [175, 141],  
 [176, 343], [177, 46], [178, 276], [179, 147], [180, 379], [181, 262], [182, 63],  
 [183, 378], [184, 256], [185, 27], [186, 162], [187, 469], [188, 299], [189, 285],  
 [190, 201], [191, 200], [192, 194], [193, 158], [194, 445], [195, 155], [196, 427],  
 [197, 47], [198, 282], [199, 183], [200, 92], [201, 49], [202, 294], [203, 255],  
 [204, 21], [205, 126], [206, 253], [207, 9], [208, 54], [209, 324], [210, 435],  
 [211, 95], [212, 67], [213, 402], [214, 400], [215, 388], [216, 316], [217, 387],  
 [218, 310], [219, 351], [220, 94], [221, 61], [222, 366], [223, 184], [224, 98],  
 [225, 85], [226, 7], [227, 42], [228, 252], [229, 3], [230, 18], [231, 108], [232, 145],  
 [233, 367], [234, 190], [235, 134], [236, 301], [237, 297], [238, 273], [239, 129],  
 [240, 271], [241, 117], [242, 199], [243, 188], [244, 122], [245, 229], [246, 368],  
 [247, 196], [248, 170], [249, 14], [250, 84], [251, 1],

[252, 6], [253, 36], [254, 216], [255, 290], [256, 231], [257, 380], [258, 268],  
[259, 99], [260, 91], [261, 43], [262, 258], [263, 39], [264, 234], [265, 398],  
[266, 376], [267, 244], [268, 458], [269, 233], [270, 392], [271, 340], [272, 28],  
[273, 168], [274, 2], [275, 12], [276, 72], [277, 432], [278, 77], [279, 462],  
[280, 257], [281, 33], [282, 198], [283, 182], [284, 86], [285, 13], [286, 78],  
[287, 468], [288, 293], [289, 249], [290, 488], [291, 413], [292, 466], [293, 281],  
[294, 177], [295, 56], [296, 336], [297, 4], [298, 24], [299, 144], [300, 361],  
[301, 154], [302, 421], [303, 11], [304, 66], [305, 396], [306, 364], [307, 172],  
[308, 26], [309, 156], [310, 433], [311, 83], [312, 498], [313, 473], [314, 323],  
[315, 429], [316, 59], [317, 354], [318, 112], [319, 169], [320, 8], [321, 48],  
[322, 288], [323, 219], [324, 308], [325, 339], [326, 22], [327, 132], [328, 289],  
[329, 225], [330, 344], [331, 52], [332, 312], [333, 363], [334, 166], [335, 493],  
[336, 443], [337, 143], [338, 355], [339, 118], [340, 205], [341, 224], [342, 338],  
[343, 16], [344, 96], [345, 73], [346, 438], [347, 113], [348, 175], [349, 44],  
[350, 264], [351, 75], [352, 450], [353, 185], [354, 104], [355, 121], [356, 223],  
[357, 332], [358, 483], [359, 383], [360, 286], [361, 207], [362, 236], [363, 410],  
[364, 448], [365, 173], [366, 32], [367, 192], [368, 146], [369, 373], [370, 226],  
[371, 350], [372, 88], [373, 25], [374, 150], [375, 397], [376, 370], [377, 208],  
[378, 242], [379, 446], [380, 161], [381, 463], [382, 263], [383, 69], [384, 414],  
[385, 472], [386, 317], [387, 393], [388, 346], [389, 64], [390, 384], [391, 292],  
[392, 243], [393, 452], [394, 197], [395, 176], [396, 50], [397, 300], [398, 291],  
[399, 237], [400, 416], [401, 484], [402, 389], [403, 322], [404, 423], [405, 23],  
[406, 138], [407, 325], [408, 441], [409, 131], [410, 283], [411, 189], [412, 128],  
[413, 265], [414, 81], [415, 486], [416, 401], [417, 394], [418, 352], [419, 100],  
[420, 97], [421, 79], [422, 474], [423, 329], [424, 465], [425, 275], [426, 141],  
[427, 343], [428, 46], [429, 276], [430, 147], [431, 379], [432, 262], [433, 63],  
[434, 378], [435, 256], [436, 27], [437, 162], [438, 469], [439, 299], [440, 285],  
[441, 201], [442, 200], [443, 194], [444, 158], [445, 445], [446, 155], [447, 427],  
[448, 47], [449, 282], [450, 183], [451, 92], [452, 49], [453, 294], [454, 255],  
[455, 21], [456, 126], [457, 253], [458, 9], [459, 54], [460, 324], [461, 435],  
[462, 95], [463, 67], [464, 402], [465, 400], [466, 388], [467, 316], [468, 387],  
[469, 310], [470, 351], [471, 94], [472, 61], [473, 366], [474, 184], [475, 98],  
[476, 85], [477, 7], [478, 42], [479, 252], [480, 3], [481, 18], [482, 108], [483, 145],  
[484, 367], [485, 190], [486, 134], [487, 301], [488, 297], [489, 273], [490, 129],  
[491, 271], [492, 117], [493, 199], [494, 188], [495, 122], [496, 229], [497, 368],  
[498, 196], [499, 170], [500, 14], [501, 84], [502, 1]

## Tables 12

Puissances de 7 modulo 503: Le premier chiffre représente l'exposant, autrement dit  $[78, 156]$  se lit  $7^{78} \equiv 156 \pmod{503}$

[1, 7], [2, 49], [3, 343], [4, 389], [5, 208], [6, 450], [7, 132], [8, 421], [9, 432], [10, 6], [11, 42], [12, 294], [13, 46], [14, 322], [15, 242], [16, 185], [17, 289], [18, 11], [19, 77], [20, 36], [21, 252], [22, 255], [23, 276], [24, 423], [25, 446], [26, 104], [27, 225], [28, 66], [29, 462], [30, 216], [31, 3], [32, 21], [33, 147], [34, 23], [35, 161], [36, 121], [37, 344], [38, 396], [39, 257], [40, 290], [41, 18], [42, 126], [43, 379], [44, 138], [45, 463], [46, 223], [47, 52], [48, 364], [49, 33], [50, 231], [51, 108], [52, 253], [53, 262], [54, 325], [55, 263], [56, 332], [57, 312], [58, 172], [59, 198], [60, 380], [61, 145], [62, 9], [63, 63], [64, 441], [65, 69], [66, 483], [67, 363], [68, 26], [69, 182], [70, 268], [71, 367], [72, 54], [73, 378], [74, 131], [75, 414], [76, 383], [77, 166], [78, 156], [79, 86], [80, 99], [81, 190], [82, 324], [83, 256], [84, 283], [85, 472], [86, 286], [87, 493], [88, 433], [89, 13], [90, 91], [91, 134], [92, 435], [93, 27], [94, 189], [95, 317], [96, 207], [97, 443], [98, 83], [99, 78], [100, 43], [101, 301], [102, 95], [103, 162], [104, 128], [105, 393], [106, 236], [107, 143], [108, 498], [109, 468], [110, 258], [111, 297], [112, 67], [113, 469], [114, 265], [115, 346], [116, 410], [117, 355], [118, 473], [119, 293], [120, 39], [121, 273], [122, 402], [123, 299], [124, 81], [125, 64], [126, 448], [127, 118], [128, 323], [129, 249], [130, 234], [131, 129], [132, 400], [133, 285], [134, 486], [135, 384], [136, 173], [137, 205], [138, 429], [139, 488], [140, 398], [141, 271], [142, 388], [143, 201], [144, 401], [145, 292], [146, 32], [147, 224], [148, 59], [149, 413], [150, 376], [151, 117], [152, 316], [153, 200], [154, 394], [155, 243], [156, 192], [157, 338], [158, 354], [159, 466], [160, 244], [161, 199], [162, 387], [163, 194], [164, 352], [165, 452], [166, 146], [167, 16], [168, 112], [169, 281], [170, 458], [171, 188], [172, 310], [173, 158], [174, 100], [175, 197], [176, 373], [177, 96], [178, 169], [179, 177], [180, 233], [181, 122], [182, 351], [183, 445], [184, 97], [185, 176], [186, 226], [187, 73], [188, 8], [189, 56], [190, 392], [191, 229], [192, 94], [193, 155], [194, 79], [195, 50], [196, 350], [197, 438], [198, 48], [199, 336], [200, 340], [201, 368], [202, 61], [203, 427], [204, 474], [205, 300], [206, 88], [207, 113], [208, 288], [209, 4], [210, 28], [211, 196], [212, 366], [213, 47], [214, 329], [215, 291], [216, 25], [217, 175], [218, 219], [219, 24], [220, 168], [221, 170], [222, 184], [223, 282], [224, 465], [225, 237], [226, 150], [227, 44], [228, 308], [229, 144], [230, 2], [231, 14], [232, 98], [233, 183], [234, 275], [235, 416], [236, 397], [237, 264], [238, 339], [239, 361], [240, 12], [241, 84], [242, 85], [243, 92], [244, 141], [245, 484], [246, 370], [247, 75], [248, 22], [249, 154], [250, 72], [251, 1],

[252, 7], [253, 49], [254, 343], [255, 389], [256, 208], [257, 450], [258, 132],  
[259, 421], [260, 432], [261, 6], [262, 42], [263, 294], [264, 46], [265, 322],  
[266, 242], [267, 185], [268, 289], [269, 11], [270, 77], [271, 36], [272, 252],  
[273, 255], [274, 276], [275, 423], [276, 446], [277, 104], [278, 225], [279, 66],  
[280, 462], [281, 216], [282, 3], [283, 21], [284, 147], [285, 23], [286, 161],  
[287, 121], [288, 344], [289, 396], [290, 257], [291, 290], [292, 18], [293, 126],  
[294, 379], [295, 138], [296, 463], [297, 223], [298, 52], [299, 364], [300, 33],  
[301, 231], [302, 108], [303, 253], [304, 262], [305, 325], [306, 263], [307, 332],  
[308, 312], [309, 172], [310, 198], [311, 380], [312, 145], [313, 9], [314, 63],  
[315, 441], [316, 69], [317, 483], [318, 363], [319, 26], [320, 182], [321, 268],  
[322, 367], [323, 54], [324, 378], [325, 131], [326, 414], [327, 383], [328, 166],  
[329, 156], [330, 86], [331, 99], [332, 190], [333, 324], [334, 256], [335, 283],  
[336, 472], [337, 286], [338, 493], [339, 433], [340, 13], [341, 91], [342, 134],  
[343, 435], [344, 27], [345, 189], [346, 317], [347, 207], [348, 443], [349, 83],  
[350, 78], [351, 43], [352, 301], [353, 95], [354, 162], [355, 128], [356, 393],  
[357, 236], [358, 143], [359, 498], [360, 468], [361, 258], [362, 297], [363, 67],  
[364, 469], [365, 265], [366, 346], [367, 410], [368, 355], [369, 473], [370, 293],  
[371, 39], [372, 273], [373, 402], [374, 299], [375, 81], [376, 64], [377, 448],  
[378, 118], [379, 323], [380, 249], [381, 234], [382, 129], [383, 400], [384, 285],  
[385, 486], [386, 384], [387, 173], [388, 205], [389, 429], [390, 488], [391, 398],  
[392, 271], [393, 388], [394, 201], [395, 401], [396, 292], [397, 32], [398, 224],  
[399, 59], [400, 413], [401, 376], [402, 117], [403, 316], [404, 200], [405, 394],  
[406, 243], [407, 192], [408, 338], [409, 354], [410, 466], [411, 244], [412, 199],  
[413, 387], [414, 194], [415, 352], [416, 452], [417, 146], [418, 16], [419, 112],  
[420, 281], [421, 458], [422, 188], [423, 310], [424, 158], [425, 100], [426, 197],  
[427, 373], [428, 96], [429, 169], [430, 177], [431, 233], [432, 122], [433, 351],  
[434, 445], [435, 97], [436, 176], [437, 226], [438, 73], [439, 8], [440, 56],  
[441, 392], [442, 229], [443, 94], [444, 155], [445, 79], [446, 50], [447, 350],  
[448, 438], [449, 48], [450, 336], [451, 340], [452, 368], [453, 61], [454, 427],  
[455, 474], [456, 300], [457, 88], [458, 113], [459, 288], [460, 4], [461, 28],  
[462, 196], [463, 366], [464, 47], [465, 329], [466, 291], [467, 25], [468, 175],  
[469, 219], [470, 24], [471, 168], [472, 170], [473, 184], [474, 282], [475, 465],  
[476, 237], [477, 150], [478, 44], [479, 308], [480, 144], [481, 2], [482, 14],  
[483, 98], [484, 183], [485, 275], [486, 416], [487, 397], [488, 264], [489, 339],  
[490, 361], [491, 12], [492, 84], [493, 85], [494, 92], [495, 141], [496, 484],  
[497, 370], [498, 75], [499, 22], [500, 154], [501, 72], [502, 1]