IE CSE

Inter-Section Coding: Round 1

1. Find the count of Numbers which are relatively prime to 6996.For example, as 1,2,4,5,7,and 8, are all less than nine and relatively prime to nine, So the count will be 6.

2. Given an integer array nums, return the number of range sums that lie in [lower, upper] inclusive. Range sum S(i, j) is defined as the sum of the elements in nums between indices i and j (i ≤ j), inclusive.

Example:

Given nums = [-2, 5, -1], lower = -2, upper = 2,

Return 3.

The three ranges are : [0, 0], [2, 2], [0, 2] and their respective sums are: -2, -1, 2.

Return the answer when nums(60 elements)=[90 59 -53 85 15 -10 -63 14 57 -92 -70 93 -7 64 79 24 53 -61 98 58 51 -13 98 -31 -84 56 -85 68 86 96 -25 53 -29 7 -80 -34 5 -85 -52 -29 -70 -81 -62 35 -10 86 -92 58 52 -51 -64 -18 41 43 -52 1 -37 92 43 60], lower=-68 and upper=70.

3. Given an integer matrix, find the length of the longest increasing path.

From each cell, you can either move to four directions: left, right, up or down. You may NOT move diagonally or move outside of the boundary (i.e. wrap-around is not allowed).

Example 1:

nums = [

[9,9,4],

[6,6,8],

[2,1,1]

]

Return 4

The longest increasing path is [1, 2, 6, 9].

Example 2:

nums = [

[3,4,5],

[3,2,6],

[2,2,1]

]

Return 4

The longest increasing path is [3, 4, 5, 6]. Moving diagonally is not allowed.

Return the length of the longest increasing path when the following 20X20 Matrix is provided:

[[19 7 76 86 79 95 82 95 93 55 35 21 67 9 79 79 44 71 26 91],
[31 90 64 21 76 22 55 29 37 20 24 12 24 78 41 76 26 96 12 42],
[52 89 17 20 24 30 92 79 52 29 53 91 23 3 33 60 8 81 56 23],
[52 37 34 84 7 86 9 29 73 48 12 3 96 69 17 35 82 68 97 37],
[17 19 95 92 97 71 13 70 79 92 18 51 53 37 40 96 37 57 0 57],
[49 32 83 30 3 11 90 26 18 99 92 92 90 17 87 86 98 71 19 37],
[71 66 29 4 40 69 90 93 22 43 96 38 86 41 42 9 46 65 26 73],
[82 42 47 57 26 16 54 34 25 77 24 11 48 79 10 95 57 60 9 15],
[75 81 28 12 53 38 33 6 92 63 71 57 69 2 40 47 23 46 66 36],
[33 85 26 11 14 83 95 0 19 9 94 88 18 88 98 5 20 36 57 24],
[33 84 77 65 5 31 20 23 80 37 16 7 55 52 42 50 9 41 46 24],
[74 15 47 23 95 74 17 78 43 3 30 98 36 62 73 19 75 13 2 59],
[76 93 27 98 51 67 34 86 23 83 86 94 75 29 20 58 26 87 77 2],
[82 0 67 6 22 99 65 33 59 83 73 42 86 95 77 26 84 47 46 3],
[35 96 58 81 96 26 96 9 74 74 34 57 30 29 88 12 71 19 59 91],
[2 59 35 91 11 32 60 37 22 54 81 11 80 33 17 36 55 8 88 58],
[44 79 36 54 82 22 50 28 44 35 8 54 12 7 70 2 40 53 60 95],
[58 41 91 69 38 45 34 62 75 30 67 60 1 52 55 86 18 44 6 2],
[43 51 86 92 71 32 24 22 30 46 57 90 62 19 0 47 49 42 34 6],
[63 47 11 76 23 95 62 99 18 27 87 38 85 81 85 32 85 87 27 41]]

4.The string `"PAYPALISHIRING"` is written in a zigzag pattern on a given number of rows like this: (you may want to display this pattern in a fixed font for better legibility)

```
P   A   H   N
A P L S I I G
Y   I   R
```

And then read line by line: `"PAHNAPLSIIGYIR"`

Do the same for the string of length 100:

“`OLuqRIkJeVaAGiCIIewlEIUziFfosBiFUWmnjCvmIvLTQgnKtJBlMiPekDVYmcKzFufdVYWiYJzpWzqRRRoNLUjOuqcebfiWGxIw`”

with 7 rows.

5. Write a program to find the 105th super ugly number of prime set {2,3,7,11,13,19,23,101,197}.

Super ugly numbers are positive numbers whose all prime factors are in the given prime list primes of size k. For example, [1, 2, 4, 7, 8, 13, 14, 16, 19, 26, 28, 32] is the sequence of the first 12 super ugly numbers given primes = [2, 7, 13, 19] of size 4.

Note:
(1) 1 is a super ugly number for any given primes.

(2) The given numbers in primes are in ascending order.
(3) 0 < k ≤ 100, 0 < n ≤ 106, 0 < primes[i] < 1000.

6. A message containing letters from `A-Z` is being encoded to numbers using the following mapping:

```
'A' -> 1
'B' -> 2
...
'Z' -> 26
```

Given the following encoded message containing 100 digits:

"7931104208122516411126219772927198538221325111979652527421289532710226827339281286123751212789109122"

determine the total number of ways to decode it.

For example,

Given encoded message `"12"`, it could be decoded as `"AB"` (1 2) or `"L"` (12).

The number of ways decoding `"12"` is 2.

7. Find the *4,269th* prime number. Subtract half of its value from it, multiply it by *42*, and add *69*. Give the output.

8. You are given 3 numbers *A*, *B* and *N*. You need to output the multiple of *N* which is closest to *AB*. If more than one answer exists, display the smallest one.

[A=99, B=2, N= 12345]

9. Given input *N* , Calculate ${}^{N}C_{R}$, where *R* is the individual sum of squares of the digits of *N*.

[N=999]

10. How many *1000* digit numbers (without leading zeroes) are there such that no digit occurs more than 10^9 times? Give the output modulo 10^9+7.

11.

The prime 41, can be written as the sum of six consecutive primes:

$$41 = 2 + 3 + 5 + 7 + 11 + 13$$

This is the longest sum of consecutive primes that adds to a prime below one-hundred.
The longest sum of consecutive primes below one-thousand that adds to a prime, contains 21 terms, and is equal to 953.
Which prime, below one-million, can be written as the sum of the most consecutive primes?

12

The divisors of 6 are 1,2,3 and 6.
The sum of the squares of these numbers is 1+4+9+36=50.
Let sigma2(n) represent the sum of the squares of the divisors of n. Thus sigma2(6)=50.
Let SIGMA2 represent the summatory function of sigma2, that is SIGMA2(n)=∑sigma2(i) for i=1 to n.
The first 6 values of SIGMA2 are: 1,6,16,37,63 and 113.
Find SIGMA2(10^{15}) modulo 10^9

13:

Consider the right angled triangle with sides a=7, b=24 and c=25. The area of this triangle is 84, which is divisible by the perfect numbers 6 and 28.
Moreover it is a primitive right angled triangle as gcd(a,b)=1 and gcd(b,c)=1.
Also c is a perfect square.
We will call a right angled triangle perfect if
-it is a primitive right angled triangle
-its hypotenuse is a perfect square
We will call a right angled triangle super-perfect if
-it is a perfect right angled triangle and
-its area is a multiple of the perfect numbers 6 and 28.
How many perfect right-angled triangles with c≤10^{16} exist that are not super-perfect?

14. The fraction 49/98 is a curious fraction, as an inexperienced mathematician in attempting to simplify it may incorrectly believe that 49/98 = 4/8, which is correct, is obtained by cancelling the 9s.
We shall consider fractions like, 30/50 = 3/5, to be trivial examples.
There are exactly four non-trivial examples of this type of fraction, less than one in value, and containing two digits in the numerator and denominator.
If the product of these four fractions is given in its lowest common terms, find the value of the denominator.

15. Given an array of 400 elements find the 191st smallest number.
arr[]={402 416 344 805 725 188 254 998 75 55 295 306 516 919 82 687 70 393 744 796 579 281 336 960 70 943 996 296 649 751 587 566 708 208 101 78 771 681 882 237 590 127 807 148 244 621 944 1 810 980 803 852 896 283 278 804 702 643 530 519 548 124 575 475 779 330 102 338 743 825 88 383 105 178 113 923 115 160 882 321 549 330 367 237 974 999 123 463 663 375 832 834 961 475 816 439 147 290 322 602 880 535 642 853 123 243 729 450 36 415 830 811 699 909 803 627 698 759 183 272 531 158 800 623 514 410 714 291 374 258 507 834 993 121 518 471 830 963 441 440 394 677 804 185 771 121 256 181 612 202 247 393 162 672 644 976 926 644 70 114 250 180 258 575 695 686 510 869 350 260 452 691 346 602 588 667 696 545 869 292 265 804 334 346 78 60 160 5 429 76 885 333 238 138 371 817 875 763 107 151 258 256 782 520 362 416 665 221 394 418 239 583 820 633 681 793 95 969 255 407 428 120 415 64 171 960 423 130 428 214 605 796 335 449 917 455 13 368 391 12 596 373 130 164 900 373 985 571 212 854 721 277 420 288 479 705 196 79 609 37 232

361 477 819 580 136 711 175 10 436 436 132 915 423 439 128 693 588 900 972 741 520 257 172 154 10 13 782 974 645 827 641 376 387 992 172 465 82 531 695 498 277 455 567 171 195 401 306 308 239 778 276 694 925 748 425 52 724 877 45 125 887 17 500 636 974 83 408 448 449 659 805 590 436 24 415 957 419 58 265 372 449 662 535 414 225 788 708 870 196 907 810 920 719 748 752 205 192 465 585 729 963 942 763 164 799 819 361 462 659 964 561 885 523 529 601 459 74 452 845 615 104 228 558 235 602 54 496 666 646 2 424 261 340 690 225 898 294 49 390 }

16. Given an array of integers find the result of the “annoying operation”. The “annoying operation” is defined as follows. (assume result is initially 0):

1. if the number is even and in an even position in the array add it to your result.
2. if the number is even and in an odd position in the array subtract it from your result.
3. if the number is odd and in an even position in the array multiply it toyour result.
4. if the number is odd and in an odd position perform integer division where the number is the divisor and the result is the dividend.

Perform all these operations beginning from the start of the array. Assume the first element is at position 1.

arr[]={402 416 344 805 725 188 254 998 75 55 295 306 516 919 82 687 70 393 744 796 579 281 336 960 70 943 996 296 649 751 587 566 708 208 101 78 771 681 882 237 590 127 807 148 244 621 944 1 810 980 803 852 896 283 278 804 702 643 530 519 548 124 575 475 779 330 102 338 743 825 88 383 105 178 113 923 115 160 882 321 549 330 367 237 974 999 123 463 663 375 832 834 961 475 816 439 147 290 322 602 880 535 642 853 123 243 729 450 36 415 830 811 699 909 803 627 698 759 183 272 531 158 800 623 514 410 714 291 374 258 507 834 993 121 518 471 830 963 441 440 394 677 804 185 771 121 256 181 612 202 247 393 162 672 644 976 926 644 70 114 250 180 258 575 695 686 510 869 350 260 452 691 346 602 588 667 696 545 869 292 265 804 334 346 78 60 160 5 429 76 885 333 238 138 371 817 875 763 107 151 258 256 782 520 362 416 665 221 394 418 239 583 820 633 681 793 95 969 255 407 428 120 415 64 171 960 423 130 428 214 605 796 335 449 917 455 13 368 391 12 596 373 130 164 900 373 985 571 212 854 721 277 420 288 479 705 196 79 609 37 232 361 477 819 580 136 711 175 10 436 436 132 915 423 439 128 693 588 900 972 741 520 257 172 154 10 13 782 974 645 827 641 376 387 992 172 465 82 531 695 498 277 455 567 171 195 401 306 308 239 778 276 694 925 748 425 52 724 877 45 125 887 17 500 636 974 83 408 448 449 659 805 590 436 24 415 957 419 58 265 372 449 662 535 414 225 788 708 870 196 907 810 920 719 748 752 205 192 465 585 729 963 942 763 164 799 819 361 462 659 964 561 885 523 529 601 459 74 452 845 615 104 228 558 235 602 54 496 666 646 2 424 261 340 690 225 898 294 49 390 }

17. Given integers 531441,177141,1594323 write a function to determine if each of them is a power of three.If it is power of three it corresponds to 1,else it corresponds to 0.For example if the integers are 81,243,16, Your Answer will be **110.**

18. A puzzle consists of three rods, and a number of disks of different sizes which can slide onto any rod. The puzzle starts with the disks in a neat stack in ascending order of size on one rod, the smallest at the top, thus making a conical shape.

The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

1.Only one disk can be moved at a time.

2.Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.

3.No disk may be placed on top of a smaller disk.

Print the number of steps taken to solve the puzzle given the the number of discs is 35.

19.

Alien Fred wants to destroy the Earth, but he forgot the password that activates the planet destroyer.

You are given a String S. Fred remembers that the correct password can be obtained from S by erasing exactly one character.

Return the number of different passwords Fred needs to try if the given String is “hnuaaddtbhheddddduojuvvzeuacmdyvhctttttufyzhjjicinhoooogjwymrjebdmaaaaabpikenxociueukewnnsmhhhhhlzeui”

Constraints

Each character in S will be an lowercase English letter ('a'-'z').

Examples

0)

"a"

Returns: 1

In this case, the only password Fred needs to try is an empty string.

1)

"aba"

Returns: 3

The following three passwords are possible in this case: "BA", "AA", "AB".

20.

Limak is a little polar bear. Today he found two things in the snow: a bucket of blue paint and a white rectangular grid with W times H square cells.

Limak is going to paint some (possibly even all) cells blue. He wants to do it in such a way that the blue cells will form a completely filled blue rectangle. He has enough paint for M cells. What is the largest possible area of a blue rectangle he can paint?

Constraints

- W and H will be between 1 and 10^6, inclusive. - M will be between 1 and 10^12, inclusive.

Examples

0)

3

5

14

Returns: 12

Limak has a grid that is W = 3 cells wide and H = 5 cells tall. He doesn't have enough paint to color all 15 cells. He also cannot color just 14 or 13 cells in a way that would produce a blue rectangle. The best

he can do is to color four consecutive rows blue. This will produce a blue rectangle. Its area is 12 squares.

1)

4

4

10

Returns: 9

Here the best solution is to paint a rectangle of size 3 times 3 blue. (A square is a valid rectangle.)

FINAL CASE:

1000000

1000000

720000000007