

Question 1: Minimum Unfairness

You are given a function:

```
def MinimumUnfairness(arr, k):
```

The function accepts an integer array 'arr' of length n' and an integer k. If $(x_1, x_2, x_3, \dots, x_k)$ are k numbers randomly selected from the array 'arr', the Unfairness is defined as $\max(x_1, x_2, \dots, x_k) - \min(x_1, x_2, \dots, x_k)$, where max denotes the largest integer among the k elements, and min denotes the smallest integer among the k elements. Select k integers from the array 'arr' such that its unfairness is minimized and return minimized unfairness value.

Note:

$1 \leq k \leq n.$

Example:

Input:

arr:10 100 300 200 1000 20 30

k:3

Output:

20

Explanation:

Minimum Unfairness is $\max(10, 20, 30) - \min(10, 20, 30) = 30 - 10 = 20$.

The custom input format for the above case:

7 -> size of array

10 100 300 200 1000 20 30 -> the array itself

3 -> k value

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Question 2: Repeating Digits

Implement the following function:

```
def CommonDigit(a,b,c):
```

The function accepts three positive integers 'a', 'b' and 'c' as its argument. Implement the function to find and return the common digit in all the three numbers, if there is no common digit then return -1.

Assumption:

All 3 numbers are three digit numbers

All 3 numbers can have at most 1 digit common

Example:

Input:

a:426

b:486

c:652

Output:

6

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Question 3: *Ball and Box Problem*

Implement the following function:

```
def NumberOfBalls(arr):
```

The function accepts non-negative integer array `arr` of size `n` as its argument. Every `k`th element in array is the number of balls in `k`th row of a box. Every `k`th row of the

box needs $(k + 1)^2$ balls, where $0 \leq -k \leq (n-1)$. Implement the function to find number of balls required to complete each row of the box and return the total number

of balls required

Assumption: $\text{arr}[j] \leq (k+1)^2$

Note:

Return -1 if array is null or None in the case of python.

Array indexing starts from 0

Example:

Input:

```
arr: 1 2 7 13
```

Output

7

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Question 4: Binary String Problem

You are given a function,

```
static int CountBinaryStrings(int n){
```

The function accepts an integer 'n' as its argument where 'n' is the number of bits. Implement the function to find and return the count of all distinct binary strings of length 'n' without consecutive set bits (i.e. without consecutive 1's).

Note:

 $n \geq 0$

If $n = 0$ return -1

Do not allocate extra memory

Example:

Input:

n:3

Output:

5

All possible 3 bit binary strings are 000, 001, 010, 011, 100, 101, 110 and 111. Count of binary strings without consecutive set bits is 5 (000, 001, 010, 100 and 111)

The custom input format for the above case:

3

(The line contains 'n' which represents the number of bits.)

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Question 5: *Add every nth element*

You are required to implement the following function:

```
def SumSuccessiveElements(arr, n):
```

The function accepts an array 'arr' of length 'len' and an integer 'n' as its arguments. You are required to calculate the sum of every successive nth element in the array 'arr' and return the same.

Note:

n>0

If 'arr' = NULL(or None in case of python), return -1

If 'n'> length of 'arr', return 0

Example:

Input:

arr: 10 12 16 1 5 6 3 21

len:8

n:3

Output:

22

Explanation:

3 successive elements in the given array are {16,6}, sum of whom is 22, hence 22 is returned.

The custom input format for the above case:

8

10 12 16 1 5 6 3 21

3

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Question 6: *Tile the wall*

Implement the following function:

```
def NumberOfWays(n, m):
```

The function accepts two integers 'n' and 'm' as its argument. 'n' and 'm' represents a $n \times m$ wall and you have 1×3 tile, you have to tile the wall. To tile a wall you can place the tile vertically or horizontally. Implement the function to count and return the number of unique possible ways to tile the wall.

Assumption:

$n \geq 0$ and $m \geq 0$

Output lies within integral range

Note: Return 0, if $m = 0$ or $n = 0$

Example:

Input:

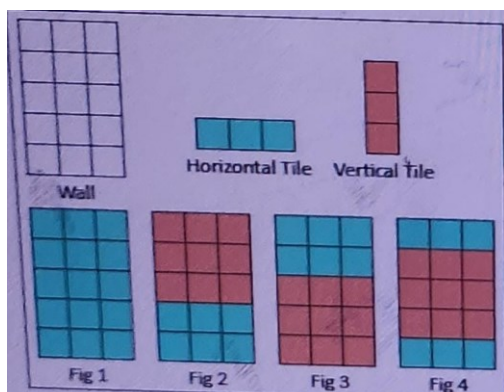
n:5

m:3

Output:

4

Explanation:



4 ways to tile the 5×3 wall with 1×3 tile are:

- In Fig 1, all 5 tiles are placed horizontally
- In Fig 2, 1st 3 tiles are placed vertically and then 2 tiles are placed horizontally
- In Fig 3, 1st 2 tiles are placed horizontally and then 3 tiles are placed vertically

- In Fig 4, 1st 1 tile is placed horizontally , then 3 tiles are placed vertically and then 1 tile is placed horizontally

The custom input format:

5

3

(The first line represents the integer 'n' and the second line represents the integer 'm')

Sample Input:

n:7

m:6

Sample Output:

3

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