Fall 2022

CSC-121

Introduction to Computer Programming

Exam-2 (*PRACTICE*)

Wednesday, October 12th 2022

Instructions:

- Phones turned off and, on your desk, facing down.
- You can only use concepts covered in class.
  - You cannot use strings or any string operations.
- You are free to define and use any functions
- You can call any functions defined in any another question of this exam.

By signing below, I certify that the work on this exam is my own

Printed Name: _____

Signature: _____

Question 1

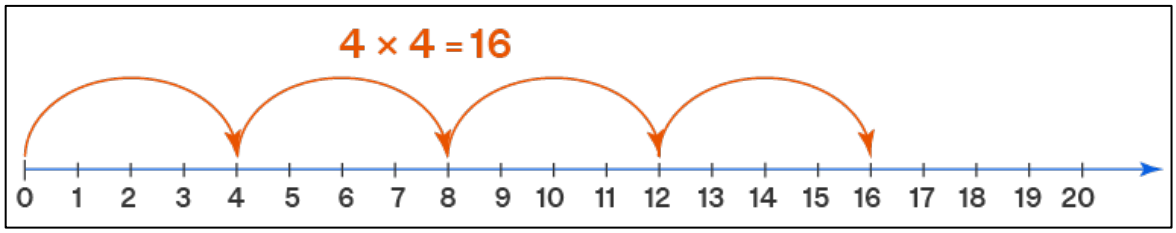
Implement **`csc121_abs`** function that accepts as input an integer **`num`** and returns the absolute value of **`num.`**

- Raise relevant errors for invalid input types and values, with informative error messages.
- Write at least 7 test cases, covering as diverse a set of inputs as you can think of.

Question 2

Write a function **`multiply`** that accepts two inputs **`x`** and **`y`** and returns the product of **`x`** and **`y`**, implemented as ***repeated addition using while loops*.**

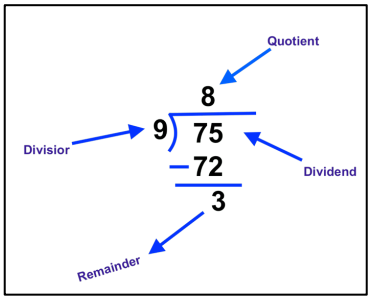
DO NOT USE THE FOLLOWING OPERATORS: *, **, //, % or any built-in functions. You may use functions from other questions of this exam.



- If any of the inputs are not explicitly specified, use default value of 1.
- Raise relevant errors for invalid input types and values, with informative error messages.
- Write at least 7 test cases, covering a diverse set of scenarios.

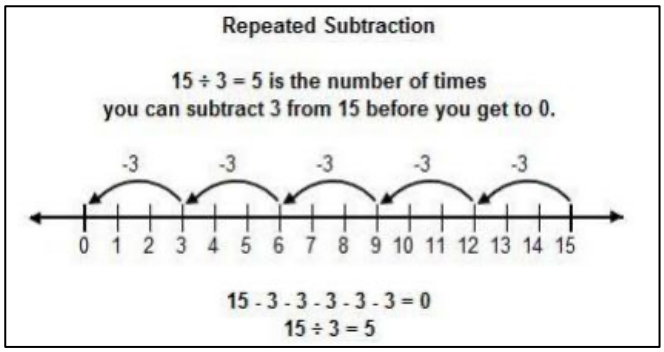
Question 3

Write a function **`divide`** that accepts two inputs **`dividend`** and **`divisor`** and returns the **`quotient`**, implementing division as ***repeated subtraction using while loops.***



DO NOT USE THE FOLLOWING OPERATORS: *, **, //, % or any other built-in functions.
You may use functions from other questions of this exam.

- If any of the inputs are not explicitly specified, use default value of 1.
- Raise relevant errors for invalid input types and values, with informative error messages.
- Write at least 7 test cases, covering a diverse set of scenarios.



Question 4

Write a function **`convert_to_celsius`** that takes as input temperature in Fahrenheit and returns the temperature in Celsius, using the following formula:

$$C = \frac{5}{9} * (F - 32)$$

Don't use multiplication operator (*) or divide operator (/). Instead, use **`multiply`** and **`divide`** from Q2 and Q3.

Question 5

Implement a function **`average_of_factorials`** which accepts an input a number **`n`** and returns the sum of factorials computed using the following formula:

$$avg\_of\_factorials(n) = \frac{1}{n}\sum_{i=1}^{n} i!$$

where `i! = i * (i - 1) * (i - 2) * … * 1` and `0! = 1`

In other words,

$$avg\_of\_factorials(n) = \frac{1}{n}\sum_{i=1}^{n}\prod_{j=1}^{i} j$$

For example, for n=4:

```
avg_of_factorials(4) = 1/4 * ((1) + (1*2) + (1*2*3) + (1*2*3*4))
```