Fundamental Structures Lab 7 February 27, 2020

Submission Instructions: This lab is due *March 5 by 11:59 PM.* Upon completion you *should upload* .py file (or .cpp if done in C++) to Canvas by 11:59 PM of the due date or commit your code to your Git repository.

Problems
In this lab, you may use either Python or C++. You should implement all functions.

1. **Factors of a Number** (30 points)
   Write a function called **FactorsOfNumber** that takes as input a positive integer and returns the factors of the positive integer as an array. For example, if the integer is 6, the output is an array consisting of the values [1 2 3 6]. Test your function on the following numbers: 26, 64, 97 and 187 *Hints:*

   (a) 1 and the number itself are always factors.

   (b) To find other factors, check up to the floor of the square root of the number. For example, if the number is 10, $floor(\sqrt{10}) = 3$.

      i. 10 mod 2 equals 0. That means 2 and 5 (which is 10/2) are factors. In this case, it is OK to dynamically grow your array.

      ii. 10 mod 3 equals 1, which means 3 is not a factor. Since we check up to 3, this completes the function and we return [1 10 2 5] as the factors of 10 (order is not important).

2. **Polynomial Evaluation** (30 points)
   This function called **polyeval** takes as **parameters** a polynomial representation as an array and a number to evaluate. For example, if the first parameter passed is [-4 0 13 6], it represents $-4 + 13x^2 + 6x^3$. For the second parameter, if 3 is passed, then a for loop can be used to calculate the value as follows: $-4 * 3^0 + 0 * 3^1 + 13 * 3^2 + 6 * 3^3$. The function returns the result of the evaluation.

3. **Congruence** (30 points)
   Implement a function called **Congruent** which returns **True** if

   $$a \equiv b(\pmod m)$$

   meaning a is congruent to $b \pmod m$ else it returns **False**. The condition for it to be true is when

   $$a \pmod m = b \pmod m$$

   The funtion takes only 3 input parameters a,b and m. The function should ensure that m is a positive integer. Give two test examples that returns True and two that returns False.

4. **Comments** (10 points)