ASSIGNMENT 3

Due September 19, 2024 at 5pm

Please complete the following steps in MATLAB:

1. Create a script called "LastName-Lab-3" (e.g. Anastasiadis-Lab-3 for me).

2. If we want to arrange only k out of n distinct objects, the number of ways to do so is

$$P(n,k) = \frac{n!}{(n-k)!}$$

This is called a k-permutation, which is an arrangement of k members of a set of n members (where order matters) . This is similar to the k-combinations we did in class , but now the order of selection of the k objects out of the n matters. The number of k-permutations out of n is P(n,k) as given above.

Write a function that calculates $P(n,k)$ (the name of the function will be your choice) without using MATLAB's built-in factorial function, but copy-paste the factorial function we did together in class and use this one. This will involve multiple loops . Your script should include if-statements that return an error if n is less than k OR if either n or k is negative. You can assume that the user will use integers for n and k.

3. Test your function from part 2 with 3 specific pairs of integers n, k (for example one pair could be $n = 3, k = 4$). The choice of the numbers on the 3 pairs will be yours.

4. Use MATLAB in order to define the following recurrence relation.

$$S(n) = \begin{cases} 1 & \text{if } n = 1 \\ S(n-1) + 2n - 1 & \text{if } n > 1 \end{cases}$$

Assume that the user will use integers for n. The domain of the function is the set of positive integers therefore you should include an error return if the user inputs a negative integer or zero.

5. Test your function from part 4 with 5 different inputs . Make sure that the first input is a non-positive integer, the second input is 1 and the last 3 inputs are integers greater than 1.

6. Run all the sections , save your script, export it as a pdf with the appropriate name and submit it on Blackboard. The results of the commands should be part of your pdf.