**50:198:211:01 C&UNIX SYSTEMS PROG**

**Midterm (Fall 2022) Instructor: Dr. Iman Dehzangi**

First name: Last name:  
ID number: Date:

You have 1:20 hours (3:40pm – 5:00pm).

* It is a time-restricted exam. Hence, please make sure that you manage your time properly to answer all the questions. The exam is closed book. No browser shoud be open except Canvas and no app should be running except your compiler.

Q1: An integer number is said to be a perfect number if its factors, including 1 (but not the number itself), sum to the number. For example, 6 is a perfect number because 6 = 1 + 2 + 3. Write a function isPerfect that determines whether parameter number is a perfect number. Use this function in a program that determines and prints all the perfect numbers between 1 and 500. Print the factors of each perfect number to confirm that the number is indeed perfect.

Q2: Assume that we have a series that is find as follows:

K1=1

K2=2

K3=3

K4=4\*K1+2\*K2+K3

...

K(n) = 4\*K (n-3) + 2\*K(n-2) + K(n-1)

Here is the sequence:

1, 2, 3, 11, 25, 59, ...

Write a recursive function to print the Kth number in this sequence (not greater than 30) that is collected from the input (user will input a number smaller or equal to 30 and the program produce the output for that number).

Ex:

Inter an integer less than 30: 6

Output: 59

Q3: Write a function (not recursive) that prints the Kth sum of the following series (not greater than 50) that is collected from the input (user will input a number smaller or equal to 50 and the program produce the entry in the series for that number).:

(1^2+1)/(1\*2+1)+ (2^2+1)/(2\*2+1) +(3^2+1)/(3\*2+1) +…

Which is:

2/3+ 5/5 +10/7+17/9

for a given input n using the function.

*Expected Output*:

Inter an integer less than 50: 4

The sum of the series (floating point) is: 4.67

Q1. 30  
Q2. 40  
Q3. 30  
  
  
 Total /100

Thanks & Good Luck