UID:

Name:

Quiz 2 : CSE 173

Handed on Saturday: 02-09-2021 at 9:40 AM
Due on Saturday: 02-09-2021 at 11:00 AM

Answering Guideline

1. Scan the answer script with name and ID on the top sheet and submit the scanned version with file name (**id_firstName.pdf**).

2. It is not allowed to consult textbooks and online sources. Keep your *meet* video on during the examination for proper proctoring.

3. It is not allowed to consult with any person who has knowledge of this subject, including other students of this course. You may ask question to the instructor if you do not understand the question, but not more than that. All solutions have to be your own work.

4. You must show all work for each problem to receive full credit.

CODE OF HONOR PLEDGE

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment.

_____
Signature

_____
Date

Answer any 6 of the following questions Marks: 6×10=60

1. Let *P(n)* be the statement that $1 \cdot 2 + 2 \cdot 3 + \cdots + n(n+1) = n(n+1)(n+2)/3$ for the positive integer *n*. **10**

a) Show that *P(1)* is true, completing the basis step of the proof.

b) What is the inductive hypothesis?

c) What do you need to prove in the inductive step?

d) Complete the inductive step, identifying where you use the inductive hypothesis.

2. **Use mathematical induction to show that $2^n > n^2 + n$ whenever *n* is an integer greater than 4.** **10**

3. **10**

Consider the following recursive definition:

$$f(m,n) = \begin{cases} 0 \quad if \quad m \geq 1 \quad and \quad n = 0 \\ 2 \quad if \quad m \geq 1 \quad and \quad n = 1 \\ 2n \quad if \quad m = 0 \quad ; \\ f(m-1, f(m,n-1)) \quad if \quad m \geq 1 \quad and \quad n \geq 2 \end{cases}$$

Find *f(1,3)* and show the steps

4. **Give a recursive definition of *F(n)* where *F(n) =1 + 2 + 3 + ... + n*.** **10**

5. **Let *S* be the set of bit strings defined recursively by** **10**

***λ* ∈ *S* and**

0*x* ∈ *S*, *x*1 ∈ *S* if *x* ∈ *S*,

where *λ* is the empty string.

Find all bit strings of length three in *S*.

6. **10**

Give Big O estimate of the number of operation used in this segment of code.

```
t=0
for i := 1 to n
   for j := 1 to n
     t = t + i*j
```

7. **10**

Find a big-*O* estimate for $\sum_{j=1}^{n} j(j+1)$.

8. **How many numbers must be selected from the set {1, 2, 3, 4, 5, 6, 7, 8} to guarantee that at least one pair of these numbers add up to 9?** **10**