



Assignment # 02

Course Name	Discrete Structures (SE103T)
Course Instructor	Mr. Abdul Basit
Semester	Spring 2024
Teaching Assistant	Harmain Asghar

Student Name	
Student Roll No	

CLOs	Descriptions
1	Analyze mathematical arguments using propositional logic and rules of inference.
2	Apply set operations build sequences and compute summations.
3	Solve various computing problem using combinatorics, graphs and trees.

Marks Distribution						
Q1/15 CLO-1	Q2/18 CLO-1	Q3/10 CLO-1	Q4/22 CLO-1	Q5/10 CLO-1	Q6/25 CLO-1	Total/100

Instructions:

1. This assignment will access your CLO-1 as per OBE.
2. Assignment will be accepted in both form hand written and soft form (both are mandatory).
3. All questions are required to be solved to get full marks.
4. You need to print the first page of the assignment and attach it on the front of your submission.
5. Solution of questions should be neat and precise otherwise will be marked direct zero.
6. In case of plagiarism, both parties will get zero marks in two assignments.
7. Consult the textbook for reference and help. Do not copy any content from the book without referring to it.

Question: 01 [10+5]

- a. Translate the following statement into English.
 $\forall x (C(x) \vee \exists y (C(y) \wedge F(x,y)))$
 $C(x)$: x has a computer.
 $F(x,y)$: x and y are friends.
Domain of x and y: all students
- b. What is the negation of the following statement? $\forall x \exists y (x = -y)$

Question: 02 [6+6+6]

- a. Let $Z(x,y)$ denote the statement " $x=y+1$ ". What is the truth value of the propositions $Z(1,3)$ and $Z(2,1)$?
- b. Translate the following statement into English.
 $\forall x \forall y (x + y = y + x)$
Domain: real numbers
- c. Translate the following statement into English.
 $\forall x \exists y (x = -y)$ Domain: real numbers

Question: 03 [10]

Explain why this argument is valid:

If I go to the movies, I will not do my homework.

I do my homework.

Therefore, I did not go to the movies.

Question: 04 [10+12]

1. Use resolution to show the hypotheses “Allen is a bad boy or Hillary is a good girl” and “Allen is a good boy or David is happy” imply the conclusion “Hillary is a good girl or David is happy.”

2. For each of these arguments determine whether the argument is correct or incorrect and explain why.

a) Everyone enrolled in the university has lived in a dormitory. Mia has never lived in a dormitory. Therefore, Mia is not enrolled in the university.

b) A convertible car is fun to drive. Isaac’s car is not a convertible. Therefore, Isaac’s car is not fun to drive.

c) Quincy likes all action movies. Quincy likes the movie Eight Men Out. Therefore, Eight Men Out is an action movie.

d) All lobstermen set at least a dozen traps. Hamilton is a lobsterman. Therefore, Hamilton sets at least a dozen traps.

Question: 05 [10]

Suppose the domain of the propositional function $P(x, y)$ consists of pairs x and y , where x is 1, 2, or 3 and y is 1, 2, or 3. Write out these propositions using disjunctions and conjunctions.

a) $\exists x P(x, 3)$

b) $\forall y P(1, y)$

c) $\exists y \neg P(2, y)$

d) $\forall x \neg P(x, 2)$

Question : 06 [18+7]

1. Let $P(x, y)$ be the statement “Student x has taken class y ,” where the domain for x consists of all students in your class and for y consists of all computer science courses at your school. Express each of these quantifications in English.

a) $\exists x \exists y P(x, y)$

b) $\exists x \forall y P(x, y)$

c) $\forall x \exists y P(x, y)$

d) $\exists y \forall x P(x, y)$

e) $\forall y \exists x P(x, y)$

f) $\forall x \forall y P(x, y)$

2. Use predicates, quantifiers, logical connectives, and mathematical operators to express the statement that there is a positive integer that is not the sum of three squares.

