Alexandria University
Faculty of Engineering
Computer Engineering Dept.

CS214: Discrete
Assigned: 8 /10/2022
Due: 15/10/2022

1 Problem 1

Suppose that A= 2, 4, 6, B= 2, 6, C= 4, 6, and D= 4, 6, 8. Determine which of these sets subsets of which other of these sets are.

2 Problem 2

Let A= a, b, c, d, e and B= a, b, c, d, e, , g, h. Find

- $A \cup B$

- $A \cap B$

- A – B

- B – A

3 Problem 3

For each of these pairs of sets, determine whether the first is a subset of the second, the second is a subset of the first or neither is a subset of the other.

- The set of people who speak English, the set of people who speak English with an Australian accent

- The set of fruits, the set of citrus fruits

- the set of students studying discrete mathematics, the set of students studying data structures

4 Problem 4

Which of these are propositions?What are the truth values of those that are propositions?

- Do not pass go.

- What time is it?

- There are no black flies in Maine.

- 4 + x = 5.

- The moon is made of green cheese.

- $2n \geq 100$

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5 Problem 5

Use truth tables to show that the following statements are logically equivalent.

- $P \wedge (Q \vee R) = (P \wedge Q) \vee (P \wedge R)$

- $\neg(P \vee Q \vee R) = (\neg P) \wedge (\neg Q) \wedge (\neg R)$

6 Problem 6

Let p and q be the propositions

- p : I bought a lottery ticket this week.

- q : I won the million dollar jackpot.

Express each of these propositions as an English sentence.

- $\neg p$

- $p \vee q$

- $p \rightarrow q$

- $p \wedge q$

- $p \Leftrightarrow q$

- $\neg p \rightarrow \neg q$

- $\neg p \wedge \neg q$

- $\neg p \vee (p \wedge q)$

7 Problem 7

Construct a truth table for each of these compound propositions.

- $(p \vee q) \vee r$

- $(p \vee \neg q) \wedge r$

- $(p \wedge q) \vee r$

- $(p \wedge q) \wedge r$

- $(p \wedge \neg q) \wedge r$

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8   Problem 8

Let p, q, and r be the propositions

- p :You get an A on the final exam.

- q :You do every exercise in this book.

- r :You get an A in this class.

Write these propositions using p, q, and r and logical connectives (including negations)

- You get an A in this class, but you do not do every exercise in this book.

- You get an A on the final, you do every exercise in this book, and you get an A in this class.

- To get an A in this class, it is necessary for you to get an A on the final.

- You get an A on the final, but you don't do every exercise in this book; nevertheless, you get an A in this class.

- Getting an A on the final and doing every exercise in this book is sufficient for getting an A in this class.

- You will get an A in this class if and only if you either do every exercise in this book or you get an A on the final.

9   Problem 9

Let p, q, and r be the propositions

- p : Grizzly bears have been seen in the area.

- q : Hiking is safe on the trail.

- r : Berries are ripe along the trail

Write these propositions using p, q, and r and logical connectives (including negations).

- Berries are ripe along the trail, but grizzly bears have not been seen in the area.

- Grizzly bears have not been seen in the area and hiking on the trail is safe, but berries are ripe along the trail.

- If berries are ripe along the trail, hiking is safe if and only if grizzly bears have not been seen in the area.

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- It is not safe to hike on the trail, but grizzly bears have not been seen in the area and the berries along the trail are ripe.

- For hiking on the trail to be safe, it is necessary but not sufficient that berries not be ripe along the trail and for grizzly bears not to have been seen in the area.

- Hiking is not safe on the trail whenever grizzly bears have been seen in the area and berries are ripe along the trail

10   Problem 10

Write each of these propositions in the form "p if and only if q" in English.

- If it is hot outside you buy an ice cream cone, and if you buy an ice cream cone it is hot outside.

- For you to win the contest it is necessary and sufficient that you have the only winning ticket.

- You get promoted only if you have connections, and you have connections only if you get promoted.

- If you watch television your mind will decay, and conversely.

- The trains run late on exactly those days when I take it

11   Problem 11

Explain, without using a truth table, why $(p \vee \neg q) \wedge (q \vee \neg r) \wedge (r \vee \neg p)$ is true when p, q, and r have the same truth value and it is false otherwise

12   Problem 12

To use the wireless network in the airport you must pay the daily fee unless you are a subscriber to the service. Express your answer in terms of w: "You can use the wireless network in the airport," d: "You pay the daily fee," and s: "You are a subscriber to the service.

You have to submit your sheet via this link https://forms.gle/54hgFrm6dxxQsJSc7