Problem Session #1

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CSE 211 - Gebze Technical University

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About CSE 211 Problem Sessions

- Assistant: Gizem Süngü (gizemsungu@gtu.edu.tr, gizemsungu.com)
- Problem Session is every Thursday between 12:30 and 13:30 (unless indicated otherwise).
- The problems are shared on Moodle before the lecture.
- The solutions of the problems are not shared so the students are responsible to learn the solutions during the lectures.
- 70% attandance is required for the problem sessions. Attandance is taken at the end of each lecture.

About CSE 211 Homeworks

- There will be 5 homeworks during the semester.
- 2 weeks will be given for each homework and no late submission will be accepted.
- They will not be group homeworks. The students are not allowed to share their answers to anyone in any circumstance. Any cheating means -100 for both sides.
- The homeworks are announced on Moodle so the students are responsible to check Moodle page of the course regularly.

About CSE 211 Homeworks

- The homeworks (both latex and pdf files in a zip file) will be submitted into the course page of Moodle.
- The latex, pdf and zip files of the homeworks should be saved as "Name_Surname_StudentId".{tex, pdf, zip}.
- If the answers of the homeworks have only calculations without any formula or any explanation -when needed- will get zero.
- Writing the homeworks on LaTeXis strongly suggested. However, hand-written paper is still accepted **IFF** hand writing of the student is **clear and understandable to read**, and the paper is well-organized. Otherwise, the assistant cannot grade the student's homework.

About CSE 211 Quizzes

- There will be 2 quizzes during the semester.
- Each quiz will be at the first 15 minutes of a problem session and it will be announced one week in advance on Moodle.
- The questions will be shared on Moodle and the students are allowed to solve them in 15 minutes.
- When the time is up, the students have 5 minutes to submit their solutions on Moodle.
- During the quiz, both camera and microphone are closed.

Overview

Problem 1:Propositional Logic

Determine whether each of these conditional statements is true or false.

a. If $1 + 1 = 2$, then $2 + 2 = 5$.

b. If $1 + 1 = 3$, then $2 + 2 = 4$.

c. If $1 + 1 = 3$, then $2 + 2 = 5$.

d. If monkeys can fly, then $1 + 1 = 3$.

Problem 2: Propositional Logic

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).

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

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

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

Problem 2: Propositional Logic

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).

d. 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.

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

Problem 3: Propositional Equivalences

Show that $(p \to r) \land (q \to r)$ and $(p \lor q) \to r$ are logically equivalent.

Problem 3: Propositional Equivalences

TABLE 7 Logical Equivalences Involving Conditional Statements.

$$p \to q \equiv \neg p \vee q$$

$$p \to q \equiv \neg q \to \neg p$$

$$p \vee q \equiv \neg p \to q$$

$$p \wedge q \equiv \neg(p \to \neg q)$$

$$\neg(p \to q) \equiv p \wedge \neg q$$

$$(p \to q) \wedge (p \to r) \equiv p \to (q \wedge r)$$

$$(p \to r) \wedge (q \to r) \equiv (p \vee q) \to r$$

$$(p \to q) \vee (p \to r) \equiv p \to (q \vee r)$$

$$(p \to r) \vee (q \to r) \equiv (p \wedge q) \to r$$

Problem 4: Propositional Equivalences

Show that each of these conditional statements is a tautology by using truth tables.

a. $(p \wedge q) \rightarrow p$

b. $p \rightarrow (p \vee q)$

c. $\neg p \rightarrow (p \rightarrow q)$

d. $(p \wedge q) \rightarrow (p \rightarrow q)$

Problem 5: Predicates and Quantifiers

Translate each of these statements into logical expressions using predicates, quantifiers, and logical connectives.

a. No one is perfect.

b. Not everyone is perfect.

c. All your friends are perfect.

d. At least one of your friends is perfect.

e. Everyone is your friend and is perfect.

f. Not everybody is your friend or someone is not perfect.

Problem 6: Predicates and Quantifiers

Translate these specifications into English where F(p) is "Printer p is out of service," B(p) is "Printer p is busy," L(j) is "Print job j is lost," and Q(j) is "Print job j is queued."

a. $\exists p\ (F(p) \wedge B(p)) \rightarrow \exists j\ L(j)$

b. $\forall p\ B(p) \rightarrow \exists j\ Q(j)$

c. $\exists j\ (Q(j) \wedge L(j)) \rightarrow \exists p\ F(p)$

d. $(\forall p\ B(p) \wedge \forall j\ Q(j)) \rightarrow \exists j\ L(j)$