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:Induction

Prove that for every positive integer n,

$1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \ldots + n(n+1)$

$= \frac{n(n+1)(n+2)}{3}$.

Problem 2: Induction

Let P(n) be the statement that n! $< n^n$, where n is an integer greater than 1.

- What is the statement P(2)?
- Show that P(2) is true, completing the basis step of the proof.
- What is the inductive hypothesis?
- What do you need to prove in the inductive step?
- Complete the inductive step.
- Explain why these steps show that this inequality is true whenever n is an integer greater than 1.

Problem 3: Induction

Prove that 2 divides n^2 + n whenever n is a positive integer.

Problem 4: Propositional Equivalences

Prove that $1^2 + 3^2 + 5^2 + ... + (2n+1)^2 = \frac{(n+1)(2n+1)(2n+3)}{3}$ whenever n is a nonnegative integer.