Department of Artificial Intelligence and Machine Learning
YZZ201 - Differential Equations
Midterm Exam

2nd Nov 2026, 13:00-14:30

Full Name : _____ Student ID: _____

Grade Table (for Lecturer use only)

| Question | Points | Score |
|---|---|---|
| 1 | 25 | |
| 2 | 25 | |
| 3 | 25 | |
| 4 | 25 | |
| Total: | 100 | |

Instructions for Midterm Exam

Welcome to the midterm exam of YZZ201 - Differential Equations and good luck! Please read the following rules and confirm by signing that you have read and understood the rules before you receive your exam:

1. The midterm exam shall be conducted between 13:00 and 14:30. Exam duration is 90 minutes. Students must finalise the exam by delivering it before 14:30. Students are not allowed to leave the exam in the first 30 minutes.

2. Student ID cards shall visibly be on the edge of desks till the end of the exam. Students without the student ID cards or Turkish identity cards shall not be participated into the exam.

3. This is a closed-book exam which means that students are not allowed to take notes, books, or any other reference material into the exam. Throughout the exam, students shall not possess mobile phones and electronic devices that are capable of storing, receiving, or transmitting information or electronic signals, such as computerised watches.

4. Students are not allowed to take a glance at the exam questions until told to do so. Students shall not communicate with any other student under any circumstances during the exam period. A student, who cheats, tries to cheat during the exam, or is identified to be cheating after investigating exam documents, is given 0 (zero) for that exam and a disciplinary investigation is opened against the student.

5. An incorrect answer to a question is awarded no marks with no consideration of any partial credit. Therefore, no partial credit will be given.

In recognition of and in the spirit of the above rules, I certify that I will neither give nor receive unpermitted aid on this examination.

Signature: _____

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1. **(25 points)** Solve the following initial value problem

$$\frac{dy}{dx} + 3y + 6y^2 = 0, \quad y(0) = -1.$$

2. **(25 points)** Solve the following initial value problem

$$y^2 - 4xy^3 + 2 + (2xy - 6x^2y^2)\,\frac{dy}{dx} = 0, \quad y(1) = 1.$$

3. **(25 points)** Solve

$$\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 9y = 0, \quad y(0) = 4, \quad \dot{y}(0) = 2.$$

4. **(25 points)** Find the steady-state solution to

$$\frac{d^2y}{dx^2} + 3\,\frac{dy}{dx} + 2y = 6xe^{4x}.$$