King Saud University
Faculty of Sciences
Department of Mathematics

First Midterm Exam
Academic Year 2025-2026 - First Semester

Exam Information	
Course name	Introduction to Differential Equations
Course Code	Math 280
Date Exam	2-10-2025
Exam Time	01: 00 PM
Duration Exam	1H30mns
Classroom No.	71
Instructor Name	Mongi Blel

Student Information	
Student's Name	
ID Number	
Section Number	
Serial Number	
General Instructions	

Instructor Name

- Your Exam consists of 4 PAGES
- Keep your mobile and smart watch out of the classroom.

This section is ONLY for instructor

#	Course Learning Outcomes (CLOs)	Related Question(s)	Points	Final Score
1	1-1 (20 points)	Q(1,2,3)		

Question 1 :

Determine $\sup A$, $\sup B$, $\inf A$ and $\inf B$, for

$$A = \left\{ \frac{(-1)^n}{2n} - \frac{(-1)^m}{3m}; \quad n, m \in \mathbb{N}; \right\},$$

$$B = \{x \in \mathbb{R} : \text{ the sequence } (x^n)_n \text{ is convergent}\}.$$

Question 2 :

Consider the sequence $(x_n)_n$ defined by $x_1 = 0$, and $x_{n+1} = \sqrt{2 + x_n}$ for all $n \in \mathbb{N}$.

1. Prove that the sequence $(x_n)_n$ is increasing and $x_n \leq 2$ for all $n \in \mathbb{N}$.
2. Deduce that the sequence $(x_n)_n$ is convergent and determine its limit.

Question 3 :

1. Give a sequence $(x_n)_n$ convergent to 0 but the series $\sum_{n\geq 1} x_n$ is divergent.

2. Study the convergence of the following series

   (a) $\sum_{n\geq 1} \frac{(-1)^n \ln n}{n}$. (b) $\sum_{n\geq 1} \frac{n2^n}{n!}$. (c) $\sum_{n\geq 1} \frac{n^n}{2^{2n}}$.

4