Faculty of Engineering and Information Sciences

UNIVERSITY OF WOLLONGONG IN DUBAI

MATH 142, Quiz 2, Winter 2023, Duration: 60 minutes

Name:____________________, ID Number:____________________

Time Allowed: 1 Hour
Total Number of Questions: 6
Total Number of Pages (incl. this page): 7

EXAM UNAUTHORISED ITEMS
Students bringing these items to the examination room shall be required to leave the items at the front of the room or outside the examination room. The University does not guarantee the safe-keeping of students' personal items during examinations. Students concerned about the safety of their valuable items should make alternative arrangements for their care.

1. Bags, including carry bags, backpacks, shoulder bags and briefcases
2. Any form of electronic device including but not limited to mobile phones, smart watches, laptops, iPads, MP3 players, handheld computers and electronic dictionaries,
3. Calculator cases and covers
4. blank paper
5. Any written material

DIRECTIONS TO CANDIDATES

1. Total marks: 40
2. All questions are compulsory.
3. Answer all questions on the given exam paper sheets.
4. Write your name and Id number on the papers provided for rough work.

(6pts)**Problem 1.**
Determine convergence or divergence of the following improper integrals,

1. $\displaystyle\int_0^3 \frac{dx}{(x-1)^{2/3}}$

2. $\displaystyle\int_2^\infty \frac{dx}{x(\ln x)^3}$

(7pts)**Problem 2.**
Solve the following differential equation

$$\frac{dy}{dx} = \frac{(y+3)(x-1)}{(y-2)(x+4)}$$

(7pts)**Problem 3.**
Show that the equation is linear and solve the initial value problem

$$x\frac{dy}{dx} - 2y = x^2, \qquad y(1) = 3$$

(7pts)**Problem 4.**
Show that the differential equation is exact and solve the equation.

$$\left(1+2x-y^3\right)dx+\left(2y-3xy^2\right)dy=0$$

(6pts)**Problem 5.**

Determine convergence or divergence of the series. Justify your answer by applying the appropriate test.

1. $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{3^n}$

2. $\displaystyle\sum_{n=1}^{\infty} \left(\frac{3n+1}{\pi n+3}\right)^n$

(7pts)**Problem 6.**

Using the Integral Test Remainder Estimate for the series $\sum_{n=1}^{\infty} \frac{1}{n^4}$ to find that the smallest number of terms needed to ensure that the sum is accurate to within 0.009.