MINISTRY OF EDUCATION AND TRAINING
NATIONAL ECONOMICS UNIVERSITY

FALCULTY OF FUNDAMENTAL SCIENCES

MIDTERM TEST

Subject: Calculus 2

Mode of study: Full time

Program:

Intake:

Allowed time: ***50 minutes***

Version: 01

Question 1: ***(2.0 points)*** Solve the differential equation:

$$\frac{dy}{dx} + xy = 2 - x + 2y$$

Question 2: ***(2.0 points)*** Use Euler's method with step size $h = 0.1$ to estimate $y(0.5)$ where $y(x)$ is the solution of the initial-value problem $y' = x^2 - y^2$, $y(0) = 1$.

Question 3: ***(2.0 points)*** Test the series:

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt[3]{n^2+1}}$$

for absolute convergence, conditional convergence or divergent. Explain what test you are applying and how you apply them.

Question 4: ***(2.0 points)*** Find the interval of convergence of the power series:

$$\sum_{n=1}^{\infty} \frac{(x-3)^n}{4^n \sqrt{n}}$$

Question 5: ***(2.0 points)*** Find a power series representation for the function:

$$f(x) = \frac{3}{2x+5}$$

Note: *No electronic devices, books or notes of any form are allowed.*

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MIDTERM TEST

Subject: Calculus 2

Mode of study: Full time

Program:

Intake:

Allowed time: ***60 minutes***

Version: 02

Question 1: ***(2.0 points}*** If $f(x,y) = \frac{x^2y}{x^4+y^2}$, does $\lim_{(x,y)\to(0,0)} f(x,y)$ exist?

Question 2: ***(2.0 points)*** Find the linear approximation of the function:

$$f(x,y,z) = \sqrt{x^2+y^2+z^2}$$

at $(3,2,6)$ and use it to approximate the number $\sqrt{(3.01)^2+(1.98)^2+(5.99)^2}$.

Question 3: ***(2.0 points))*** Find the directional derivative of the function

$$f(x,y) = \frac{2x}{x^2+y^2}$$

at the point $P(1,2)$ in the direction of vector $v = 3\vec{i} + 5\vec{j}$.

Question 4: ***(3.0 points)*** Find the largest and smallest value of the function:

$$f(x,y) = xy - x - 3y$$

over the triangular region R with vertices $(0,0)$, $(5,0)$ and $(5,5)$.

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