

DEPARTMENT OF MATHEMATIS

G2+TG2

SCHOOL OF ADVANCED SCIENCES

Fall Semester 2022-2023

Continuous Assessment Test I

Course code: BMAT 101L

Time: 90 minutes

Course Title: Calculus

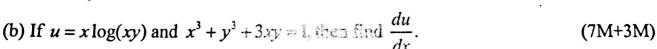
Max. Marks: 50

Answer all the questions (5x10=50M)

- 1. (i) Verify Roll'e theorem for $f(x) = x(x+3)e^{-\frac{x}{2}}$ in the interval [-3, 0].
 - (ii) Give an example of a function that is continuous on [-1, 1] and for which mean value theorem does not hold with explanations. (7M+3M)
- 2. Let $f(x) = \frac{2x^2 + 1}{x^2 1}$. Then
 - (a) Identify where the extrema of f(x) occur. (b) Find the intervals on which f(x) is increasing and decreasing. (c) Find the graph of f(x) where it is concave up and concave
- down.

 3. (i) Find the area of the region enclosed by the curves $y = x^2$ and $y^2 = 8x$.
- (ii) If the region enclosed by the curve $y = 3e^{\frac{x}{3}}$ between the ordinates x = -1 and x = 3 is revolved about the x-axis, compute the volume of the solid so generated. (5M+5M)
- 4. (a) Examine the continuity at the origin of the function

$$f(x,y) = \begin{cases} \frac{x^2}{\sqrt{x^2 + y^2}}, & (x,y) \neq (0,0) \\ 2, & (x,y) = (0,0) \end{cases}$$



5. If $x = \sqrt{vw}$, $y = \sqrt{wu}$, $z = \sqrt{uv}$ and $u = r\sin\theta\cos\phi$, $v = r\sin\theta\sin\phi$, $w = r\cos\theta$ then find $\frac{\partial(x, y, z)}{\partial(r, \theta, \phi)}$.