Name————————————————, ID ————————————

MTH 111, Math for the Architects , Exam Two

Ayman Badawi

QUESTION 1. (20 points) Find dy/dx and do not simplify.

(i) $y = ln\left(\frac{(3x+2)^5}{(x^2+4x-3)^7}\right)$

(ii) $y = e^{(3x+x^2)} + ln(3x+7) - \frac{3}{x}$

(iii) $y = \left(3x + \sqrt{2x+1} + 7\right)^6$

(iv) $y = (5x+1)e^{(5x+1)}$

(v) $y = \frac{3x+7}{x^2-x+2}$

QUESTION 2. (10 points) Find the equation of the tangent line to the ellipse $x^2 + 2y^2 + 4y - 70 = 0$ at the point $(8, 1)$

QUESTION 3. (10 points) Given $y = 4$ and $x = 4$ are tangent lines to the ellipse $\frac{(x-1)^2}{F^2} + \frac{(y-2)^2}{D^2} = 1$. Find F^2 and D^2.

QUESTION 4. (10 points) Given $y = -7x + 1$ is a tangent line to the curve $f(x) = ax^3 - x + b$ at the point (1, -6) (hence note that (1, -6) lies on the graph of f(x)). Find a and b.

QUESTION 5. (15 points) Let $f(x) = 2x - ln(4x + 10)$ where $x > -2.5$

a) Find all local min. points and all local max. points on the interval $(-2.5, \infty)$. [Recall $a - \frac{b}{c} = \frac{ac-b}{c}$ and a fraction is equal to 0 iff the numerator = 0 and denominator not equal 0]

b) Find the intervals where $f(x)$ is increasing and decreasing where $x > -2.5$.

c) Use $f'(x)$ only to sketch a rough graph of $f(x)$.

QUESTION 6. (10 points) Find the absolute maximum value and the absolute minimum value for $f(x) = 3x^3 - 24x + 10$ on the interval [-1, 3]

QUESTION 7. (i) **(4 points)** $Lim_{x\rightarrow \ 8} \ \frac{\sqrt[3]{x} + x-10}{2x-16}$

(ii) **(4 points)** $Lim_{x\rightarrow \ 2} \ \frac{e^{(x-2)} + 3x-7}{x^2-4 + ln(x-1)}$

(iii) **(4 points)** $Lim_{x\rightarrow \ 0} \ \frac{x^2+x+3}{e^x+x+5}$

QUESTION 8. (5 points). Find dy/dx where $xe^y + y^2ln(x+1) - xy + 100 = 0$

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.
E-mail: abadawi@aus.edu, www.ayman-badawi.com