MATH221 CALCULUS I 100pts TEST 2 Spring'11 INSTRUCTOR: CARLAMORRIS

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6pts 1. Is f (x) continuous at x = 1? (show work) $f(x) = \begin{cases} 3x - 5 & x = 2 \\ \dfrac{x^2 - 3x + 2}{x - 2} & x \neq 2 \end{cases}$

IN PROBLEMS 2-5 FIND THE INDICATED DERIVATIVES (5PTS EACH)

2. $f'(x)$ if $f(x) = 8x^5 + 3x^4 - 5x^3 + 9x + 1$

3. $f'(t)$ if $f(t) = (6t^5 + 4t^3 + 3t)^{45}$

4. $d/dt\ (5a^6t^5 + 7b^3t^3 + 7ct^2 - 2t + 3)$

5. $d^2/dr^2\ (8r^3 + 7r^2 + 9r + 6)\ \Big|_{r = 1}$

5pts 6. Find the equation of the tangent line to the curve $f(x) = 7x^2 + 5x + 7$ at $x = 2$

8pts 7. Sketch the graph of a function that has the following properties, $f'(3) = 0$; $f(3) = 1$, $f(0) = 10$; concave up for all x.

10pts 8. Locate all possible extrema of $f(x) = (1/3)x^3 + 4x^2 + 12x$. Also check for concavity and inflection points. Give intervals for increasing, decreasing, concavity, etc and then Sketch the graph.

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10pts 9. Graph $f(x) = x^4 - 2x^2$ by finding the x and y intercepts, relative extrema, inflection points, intervals increasing or decreasing and intervals of concavity.

8pts 10. Find the minimum value of $f(t) = 10t^3 - 15t^2 + 7$, $t > 0$ and give the value of t where this minimum occurs.

10pts 11. Suppose a man has $720 build a rectangular enclosure. The north and south sides of the enclosure cost sides cost $6 per running yard while the east and west sides which are more expensive more cost $9 per running yard. Find the dimensions of the enclosure that will maximize the area of the enclosure.

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8pts 12. Given the cost function $C(x) = x^3 - 15x^2 + 100x + 150$ find the minimum <u>marginal</u> cost.

15pts 13. Suppose the consumer demand for a certain item as a function of its price **p** is given by **x** = D (**p**) = 40 – (p / 6). Determine the production level and price that maximizes the profit if the cost output function is given by

$C(x) = x^3 + 9x^2 - 360x + 2{,}000$

formulas

$y - y_1 = m(x - x_1)$ $ax + by = c$ $y = mx + b$ $m_1 = m_2$

$m_1 = -1 / m_2$ $m = \dfrac{y_2 - y_1}{x_2 - x_1}$ $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$