

MATH 209 - Section AC

Midterm test - May 22, 2013 (6:30 - 8:00 pm)

Only approved calculators are premitted.

Total marks: 80 (20% of the final grade)

P1. Find the following limits

[6] (a) $\lim_{x \rightarrow -3} \frac{x^2 + x - 6}{x + 3}$

[6] (b) $\lim_{x \rightarrow 0} \frac{\sqrt{49 + x} - 7}{x}$

[6] (c) $\lim_{x \rightarrow \infty} \frac{-2x^2 + 3x + 5}{x^2 - 7x + 10}$

P2.

[6] (a) Given $f(x) = \begin{cases} x^2 & \text{if } x \leq 2 \\ 3x & \text{if } x > 2 \end{cases}$. Check the continuity of $f(x)$ at $x = 2$ and draw the graph of $f(x)$.

[6] (b) Using the definition (four-step method), find the derivative of the function $f(x) = 2x^2 - 5x + 6$.

P3. Find the derivative of the following functions. (Do not simplify)

[5] (a) $y = (2x^3 + x^2 - 2)(x^3 + 5)$

[5] (b) $y = \frac{1}{5}x^{-4} - 3\sqrt{x} + 5$

[5] (c) $y = e^{3x^2+7} + \ln(1 + x^3)$

[5] (d) $y = 4(3x^4 + x^3 - 2)^6$

[5] (e) $y = \frac{2x^2 - 3x + 5}{x^3 + 2}$

P4. The total cost (in dollars) of manufacturing x auto body frames is $C(x) = 60,000 + 300x$

[3] (a) Find the average cost per unit if 500 frames are produced

[4] (b) Find the marginal average cost at a production level of 500 units and interpret the result.

[3] (c) Use the results from parts (a) and (b) to estimate the average cost per frame if 501 frames are produced.

[5] P5. How long will it take money to double if it is invested at 6.5% compounded continuously?

P6.

[5] (a) Using implicit differentiation, find y' at $(-1, 3)$ given $2x^3y - x^3 + 5 = 0$

[5] (b) Find the equation of the tangent line to the graph of the above equation at the point $(-1, 3)$.