MATH 217: PRACTICE MIDTERM1 (SPRING 2007)

Name:_____

Section: _____ TA:_____

Score:

Problem 1._____

Problem 2._____

Problem 3._____

Problem 4._____

Problem 5._____

Total:_____

Instruction: Show all work. No work = no credit, even if you have a correct answer. References and calculator are not allowed.

Problem 1 (20 points): On the interval $[-2, 3]$ consider the function

$$f(x) = 2x^3 - 3x^2 - 12x.$$

Determine in which intervals the function is increasing, decreasing, concave up and concave down; determine the local extrema, global extrema and the inflection points.

Problem 2 (5 points): Use L'Hospital's rule to evaluate

$$\lim_{x \to \frac{\pi}{2}} \frac{1 - \sin x}{1 + \cos 2x}$$

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Problem 3 (20 points): Evaluate the following indefinite integrals
(a) $\int (x^2 - \frac{2}{x^3} + \sqrt{x})dx$

(b) $\int (1 + \sec^2 x + \sin 3x)dx$

Problem 4 (15 points): Find the area between the graph of the function $f(x) = \cos x \sin^3 x$ and the x-axis over $[0, \frac{\pi}{2}]$. Then find the average value of the function on this interval.

Problem 5 (10 points): Evaluate the following limit by writing it as a definite integral and then evaluate that integral. Make sure you show some justification for the definite integral you are using.

$$\lim_{n\to+\infty} \Sigma_{i=1}^{n} \frac{i^2}{n^3}.$$