Math 201

18 November 2008
Third Midterm

NAME (Print!): _____

Check one: (1pm): _____
(2pm): _____

Problem	Points	Score
1	20	
2	20	
3	30	
4	20	
5	10	
Total	100	

Problem 1 (20 points): A window has the shape of a rectangle surmounted by a semicircle. (Thus the diameter of the semicircle is equal to the width of the rectangle.) If the perimeter of the window is 30 ft, find the dimensions of the window so that the greatest amount of light is admitted. Finding the min or max from your calculator's graph isn't enough.

Problem 2 (20 points): Using Newton's method, find, correct to six decimal places, the root of the equation $\cos x - x = 0$. Also explain why there is only one root.

Problem 3 (30 points): Graph the functions $f(x) = xe^x$. Be sure to indicate clearly the

- domain of the function
- vertical and horizontal asymptotes (or tell me why there aren't any)
- minima and maxima (or tell me why there aren't any)
- inflection points (or tell me why there aren't any)

Problem 4 (20 points): Find the following

- all functions $g(x)$ so that $g'(x) = 4\sin x + \frac{2x^5 - \sqrt{x}}{x}$.

- $f(x)$ is $f'(x) = e^x + 20(1 + x^2)^{-1}$ and $f(0) = 1$.

Problem 5 (10 points): Prove that

$$\lim_{x \to 3} \frac{x}{5} + 2 = \frac{13}{5}$$

using the ε, δ definition of the limit.

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