Math 9A Second Midterm Fall 2003

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Math 9A Midtem

- This is a close book exam. The total points are 100+10.
- In each problem, you have to show every step of your calculation.

Name:______________________________
ID Number:__________________________

1. (15 points) Find the extrema of \( f(x) = x^3 + 2x^2 - 9 \) on \([-9,9]\).
2. (20 points) Find the intervals on which the functions are concave upward and the intervals on which the functions are increasing. Find all the asymptotes.

(a) \( f(x) = \frac{x^2 - 2x}{x+4} \).

(b) \( f(x) = x + 10x^2 - 9 \).
3. (15 points) Apply the mean value theorem to $f(x) = x + x^2$ on $[1,4]$. 
4. (15 points) Find \( \lim_{x \to \infty} \frac{x^2 + \frac{x}{x}}{1 + 2x - 3x^2} \).
5. (20 points) Find the dimension of the smallest area for a page with 24 square inches print and 0.8 inches margin on the top and the bottom, 0.6 inches margin on the left and the right.
6. (15+10 points) Find the differential of the function \( f(x) = x^{\frac{4}{3}} - 9 \) and apply your solution to estimate \((8.1)^{\frac{4}{3}} - 9\). (bonus problem) If we apply the Newton’s method to find a zero in \((0, 8)\) and we let \( x_1 = 4 \), what will be \( x_2 \)?