MATH 241, Fall 2008
Exam 3: December 3

NAME _____ **Discussion section** _____

1	2	3	4	5	6	7	8	Total

Arrange your work as clearly and neatly as possible, and cross out incorrect work. **Unless otherwise noted, you must justify all answers to receive full credit.** You may not use calculators, notes, or any other kinds of aids.

1. (15 points) Find all the local minima and local maxima of $x^4 - 8x^2 + 8$.

2. (15 points) Find the absolute minimum and absolute maximum values of $f(x) = \dfrac{x}{x^2+4}$ on the interval $[0, 4]$.

3. (10 points) Evaluate $\dfrac{d}{dx}\left[\displaystyle\int_1^{\cosh(x)} t\sin(t)\,dt\right]$. (No need to simplify the result.)

4. (10 points) Find where the graph of $y = x + \cos 2x$ is concave up for $0 \leq x \leq \pi$.

5. (10 points) Evaluate $\int_{-1}^{1} (3t-6)(t-2)\,dt$.

6. (10 points) Evaluate $\int_{1}^{3} \frac{9}{u^4}\,du$.

7. (15 points) A poster is to have a total area of 150 in^2. When printed, it must leave a top margin of 2 in, and margins on the sides and bottom of 1 in each. What are the overall poster dimensions that give the maximum possible printed area? (The diagram does not show the solution!)

8. (15 points) Suppose the height h of a building 120 meters away is calculated by measuring the angle θ it subtends, so that $h = 120\tan(\theta)$. If $\theta = \pi/6$ with a 5% error, estimate the absolute error in the height.