Exam 2 April 13, 2006 SHOW ALL WORK
Math 25 Calculus I Either circle your answers or place on answer line.

[14] 1.) Given $y = (x^2 + 1)^x$, find y'. Simplify your answer.

Answer 1.) _____

[13] 2.) Given $yx^2 + 10 = y^3$, find y''. You do NOT need to simplify your answer and you can leave your answer in terms of x and y (and only in terms of x and y, y' should not appear in your final answer).

Answer 2.) _____

[14] 3.) Calculate the following limit. Show all steps.

$\lim_{x\to 0^+} xln(x) \ =$ _____

[5] 4a.) State the Mean Value Theorem

[8] 4b.) Use the Mean Value Theorem (or Rolle's theorem) to show $f(x) = \ln(x) + x$ is one-to-one [Hint: recall f is one-to-one if $f(a) = f(b)$ implies $a = b$. Assume $f(a) = f(b)$ and show $a = b$ WHEN a and b are in the domain of f].

[13] 5.) Two people start at the same point, say the origin. Person A walks east at a constant rate of 1m/s. Person B walks northeast (45 degrees north of east) at 2m/s. What is the rate of change in the distance between person A and person B after 20 seconds [law of cosines: $a^2 = b^2 + c^2 - 2bc\ cos(\alpha)$].

Answer 5.) _____

[13] 6. A box with a square base and open top must have volume of $1000cm^3$. Find the dimensions of the box that minimizes the amount of material used.

Answer 6.) _____

6.) Find the following for $f(x) = \frac{4-x^2}{x^2-9} = \frac{(2-x)(2+x)}{(x-3)(x+3)}$ (if they exist; if they don't exist, state so). Use this information to graph f.

Note $f'(x) = \frac{10x}{(x^2-9)^2}$ and $f''(x) = \frac{-30(x^2+3)}{(x^2-9)^3}$

[1.5] 6a.) critical numbers: _____

[1.5] 6b.) local maximum(s) occur at $x =$ _____

[1.5] 6c.) local minimum(s) occur at $x =$ _____

[1.5] 6d.) The global maximum of f on the interval [0, 3] is _____ and occurs at $x =$ _____

[1.5] 6e.) The global minimum of f on the interval [0, 3] is _____ and occurs at $x =$ _____

[1.5] 6f.) Inflection point(s) occur at $x =$ _____

[1.5] 6g.) f increasing on the intervals _____

[1.5] 6h.) f decreasing on the intervals _____

[1.5] 6i.) f is concave up on the intervals _____

[1.5] 6j.) f is concave down on the intervals_____

[1.5] 6k.) Equation(s) of vertical asymptote(s)_____

[4] 6l.) Equation(s) of horizontal and/or slant asymptote(s)_____

[4.5] 6m.) Graph f