MATH 211 TEST II NAME _____

Prof. J. Beachy 3/7/97 Circle recitation time: T 11 Th 10 Th 11

NO CALCULATORS! Be sure to show all necessary work.

1. (25 pts) Find the derivative of each of these functions. (There is no need to simplify.)

(a) $f(x) = (x^3 + 3x^2 - 5)(x^{-2} - 1)$

(b) $f(x) = (x^2 + 1)^2(x - 3)^3$

(c) $f(x) = \dfrac{(x-1)^3}{(x+1)^2}$

(d) $f(x) = \dfrac{x^3 + 4x}{\sqrt{x^2 + 1}}$

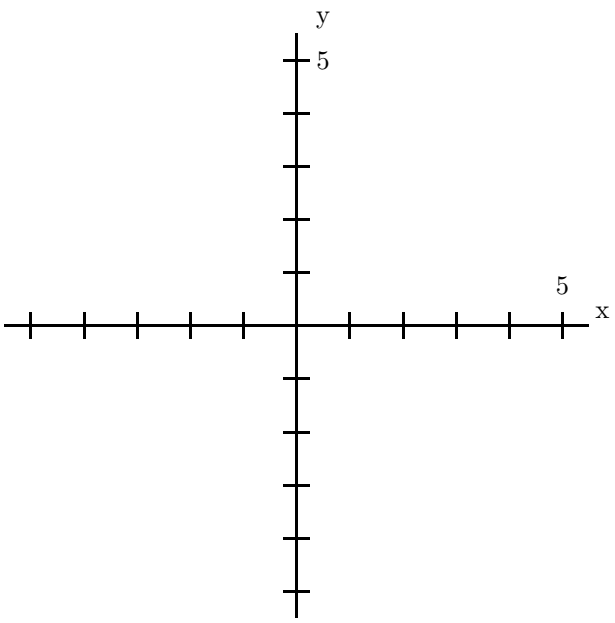
2. (15 pts) The graph of $y = x + \frac{2}{x}$ has one relative maximum point and one relative minimum point. Find the coordinates of these relative extreme points and use the second derivative to determine which point is the relative maximum and which point is the relative minimum. *You do not need to include a sketch of the graph of* $f(x)$.

3. (15 pts) The altitude (in feet) of a rocket t seconds into flight is given by
$s(t) = -t^3 + 96t^2 + 195t + 5$ (for $t \geq 0$).

(a) When does the rocket reach its maximum altitude?

(b) When does the rocket reach its maximum velocity?

4. (20 pts) On the axes below, sketch the graph of $y = x^3 - 3x^2 + 3$.
Find the intervals on which the graph is concave up or concave down.
On the graph, indicate all relative extreme points, and all inflection points.



5. (10 pts) (a) Find the equation of the tangent line to the curve $y = \sqrt{x}$ at $x = 25$.

(b) Use the tangent line (from part (a)) to approximate $\sqrt{26}$, $\sqrt{25.5}$, and $\sqrt{24}$.

6. (15 pts) A closed rectangular box with square base and a volume of 12 cubic feet is to be constructed using two different types of materials. The top is made of a metal costing \$2 per square foot, and the remainder of wood costing \$1 per square foot. Find the dimensions of the box for which the cost of materials is minimized.

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TOTAL	/ 100
GRADE	