MAT 195 – Fall Quarter 2002
TEST 4

NAME_____

Show work and write clearly.

For #1-5, find the derivative. Simplify all answers.

1. (6 pts.) $y = e^{\sin 5x}$

2. (6 pts.) $y = \dfrac{x}{\sqrt{7 - 3x}}$

3. (6 pts.) $y^5 + x^2 y^3 = 1 + ye^{x^2}$

4. (6 pts.) $2y^3 + y^2 - y^5 = x^4 - 2x^3 + x^2$

5. (7 pts.) $y = x^{\csc 2x}$

6. (7 pts.) $y = \sec^{-1}\left(e^x\right)$

For #7-9, find the second derivative. Simplify all answers.

7. (7 pts.) $y = \sqrt[3]{x} + \dfrac{1}{\sqrt[3]{x^2}}$

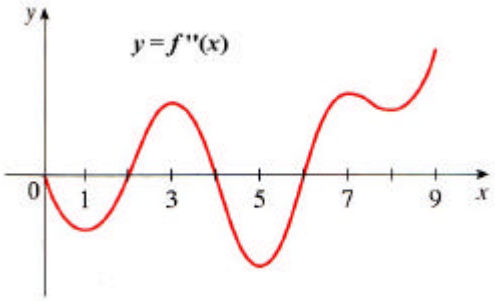
8. (7 pts.) $x^6 + y^6 = 1$

9. (7 pts.) $y = \ln(\cos(x))$

10. (6 pts.) Find the absolute maximum and the absolute minimum values of f on the given interval:
$f(x) = 10 + 27x - x^3$, $[0, 4]$.

11. (6 pts.) Sketch the graph of a function that satisfies the given conditions:
$f'(-2) = f'(5) = f''(-2) = f''(1) = 0$
$f'(x) > 0$ when $x < 5$
$f'(x) < 0$ when $x > 5$
$f''(x) > 0$ when $-2 < x < 1$
$f''(x) < 0$ when $x < -2$ and $x > 1$.

12. (6 pts.) Given the graph of $f''(x)$ below, find the intervals of concavity and the inflection points for $f(x)$. EXPLAIN.



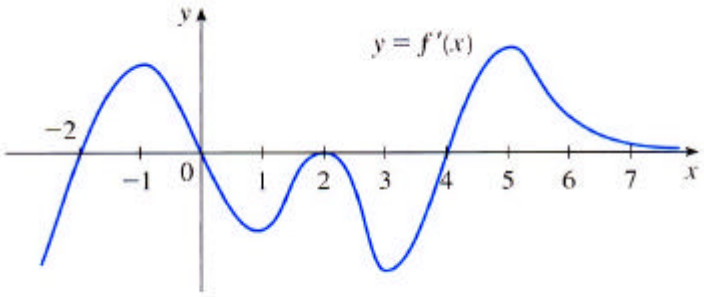
13. (6 pts.) Given the graph of $f'(x)$ below, find

a. the intervals of increase or decrease of $f(x)$

b. the relative (local) maximum and minimum values of $f(x)$

c. the intervals of concavity and the inflection points for $f(x)$

EXPLAIN.



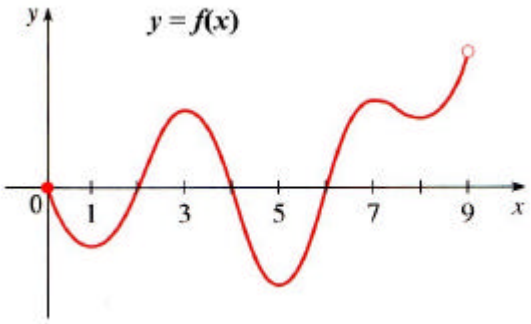
14. (6 pts.) Given the graph of $f(x)$ below, find

a. the intervals of increase or decrease $f(x)$

b. the relative (local) maximum and minimum values $f(x)$

c. the intervals of concavity and the inflection points for $f(x)$

EXPLAIN.



15. (5 pts.) Sketch the graph of a function whose first and second derivatives are always negative. EXPLAIN.

16. (6 pts.) Find the relative (local) and absolute (global) maximum and minimum value(s) and the inflection point(s) of the function, if any. EXPLAIN. [Find exact values – estimated values will not receive credit.] $f(x) = x^3 - 3x^2 - 5x + 19$