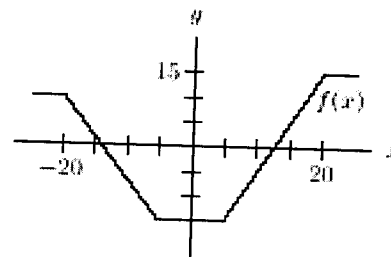
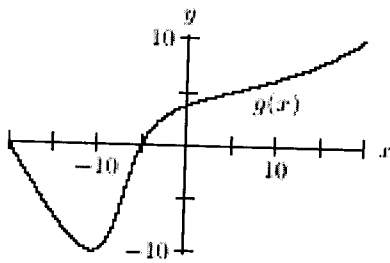


Math 77 Midterm 1

Name _____ SSN _____ Fall 2004

Show your work, the right solution without explanation is useless. Be clean and organized, it is your responsibility to make yourself understood. No graphic calculators. If you did not bring your calculator, you will have to do the exam without it, sharing calculators is not allowed. Good luck!!!

1. The graphs of $y = g(x)$ and $y = f(x)$ are given below:



(a) Estimate $f(g(5))$

Answer: _____

(b) Estimate $g(f(5))$

Answer: _____

(c) Estimate $f(g(-10))$

Answer: _____

(d) Estimate $g(f(-5))$

Answer: _____

2. An exponentially decaying substance was weighed every hour and the results are given below:

Time	Weight (in grams)
9 am	10.000
10 am	8.958
11 am	8.025
12 noon	7.189
1 pm	6.440

(a) Determine a formula of the form: $P = P_0 a^t$

Answer: _____

(b) What is the approximate half-life of the substance?

Answer: _____

3. Solve using logs:

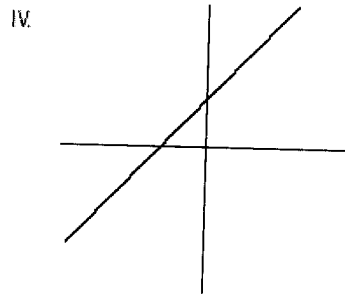
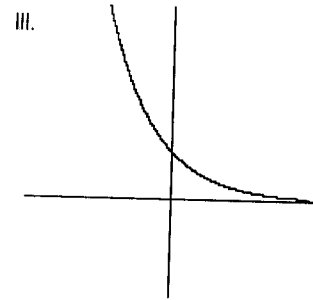
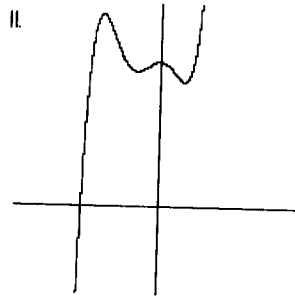
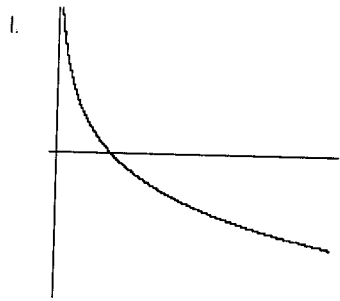
(a) $6^x = 12$

Answer: _____

(b) $2e^{4x} = 8e^{6x}$

Answer: _____

4. Match the following graphs with the formulas:



(a) $\ln(e^x) + 1$

Answer: _____

(b) $-2 \ln x$

Answer: _____

(c) e^{-x}

Answer: _____

(d) $x^5 + 2x^4 - x^3 - 2x^2 + 5$

Answer: _____

(e) $\frac{1}{x+1}$

Answer: _____

5. The height of an object in feet above the ground is given in the following table:

t (sec)	0	1	2	3	4	5	6
y (feet)	10	45	70	85	90	85	70

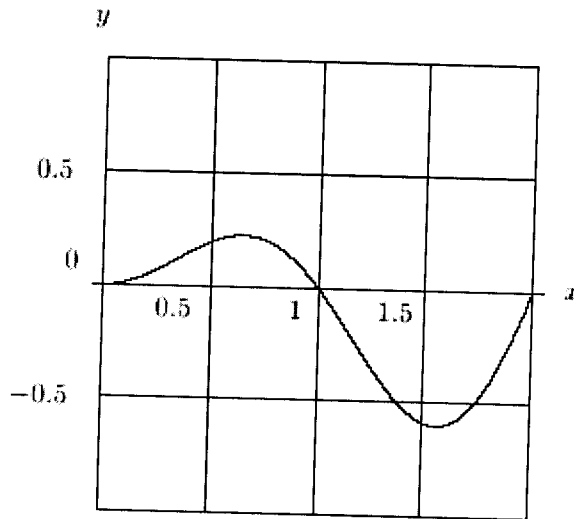
(a) Compute the average velocity over the interval $0 \leq t \leq 3$

Answer: _____

(b) Compute the average velocity over the interval $2 \leq t \leq 4$

Answer: _____

6. Below is the graph of a function f . Sketch the graph of its derivative $f'(x)$ on the same axes:



7. The noise level, N ; in decibels, of a rock concert is given by $N = f(d)$; where d is the distance in meters from the concert speakers. What do the following quantities mean to someone who lives in the neighborhood near the concert? Give units for the quantities.

(a) $f(100)$

Answer: _____

(b) $f'(1000)$

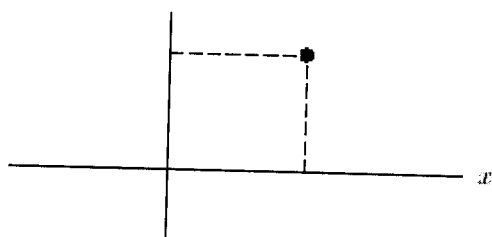
Answer: _____

(c) d such that $f(d) = 100$

Answer: _____

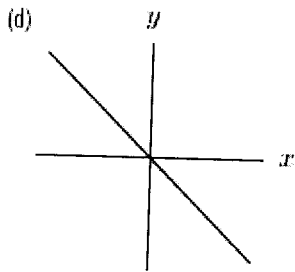
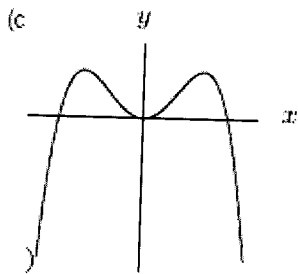
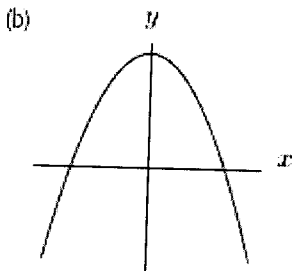
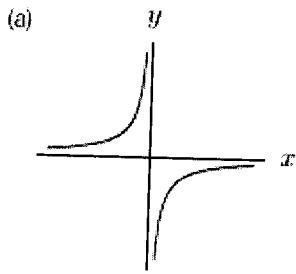
8. On the axes below, sketch a smooth, continuous curve (i.e., no sharp corners, no breaks) which passes through the point $P = (3,4)$, and which clearly satisfies the following conditions:

- Concave up to the left of P
- Increasing for $x > 0$
- Decreasing for $x < 0$
- Does not pass through the origin

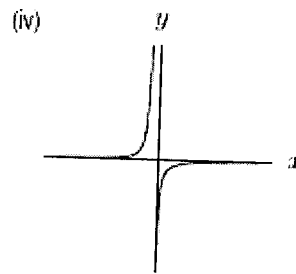
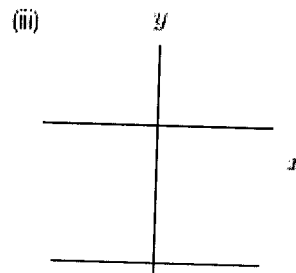
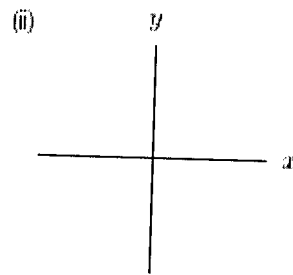
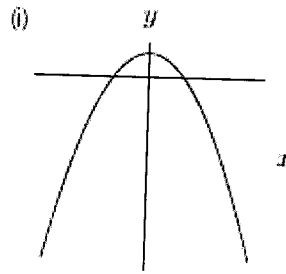


9. Each graph in the right-hand column below represents the *second* derivative of some function shown in the left-hand column. Match the functions and their second derivatives.

Functions



Second Derivatives



- Function (a) has second derivative _____
 Function (b) has second derivative _____
 Function (c) has second derivative _____
 Function (d) has second derivative _____

10. Consider the function $f(x) = x^3 - 4x^2 + 9$

(a) Estimate $f'(x)$, using $h = 0.01$ at $x = 1$

Answer: _____

(b) Find the exact derivative function using the power rule.

Answer: _____

(c) Give the equations of the tangent line at $x = 1$

Answer: _____

(d) Estimate $f(1.1)$ using the tangent line and compare it with the value of $f(1.1)$

Answer: _____