

Math 77
Midterm 1

Name _____

Fall 2005

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. Let $f(x) = x^2 + 1$ and $g(x) = 2x - 4$

(a) What is $f(g(x))$?

Answer: _____

(b) What is $g(f(x))$?

Answer: _____

(c) What is $f(f(x))$?

Answer: _____

2. Given the following function $f(x)$, :

| | | |
|--------|----|---|
| x | 0 | 1 |
| $f(x)$ | 10 | 8 |

a) If $f(x)$ is exponential, find the equation for $f(x)$

Answer: _____

b) If $f(x)$ is exponential, what is the half-life?

Answer: _____

c) If $f(x)$ is linear, find the equation for $f(x)$

Answer: _____

3. Solve using logs:

(a) $3^x = 10$

Answer: _____

(b) $e^{4x} = 8e^{7x}$

Answer: _____

4. Let $f(x) = 2x^3 + x - \frac{7}{x}$:

(a) What is $f(-x)$?

Answer: _____

(b) What is $-f(x)$?

Answer: _____

(c) Is $f(x)$ even, odd or neither?

Answer: _____

(d) True or False: $f(x)$ is symmetric with respect to the y -axis

Circle one: **True** **False**

5. Let $f(t) = t^2 + t$:

(a) What is the change in $f(t)$ between $t = 2$ and $t = 6$?

Answer: _____

(b) What is the average rate of change in $f(t)$ between $t = 2$ and $t = 6$?

Answer: _____

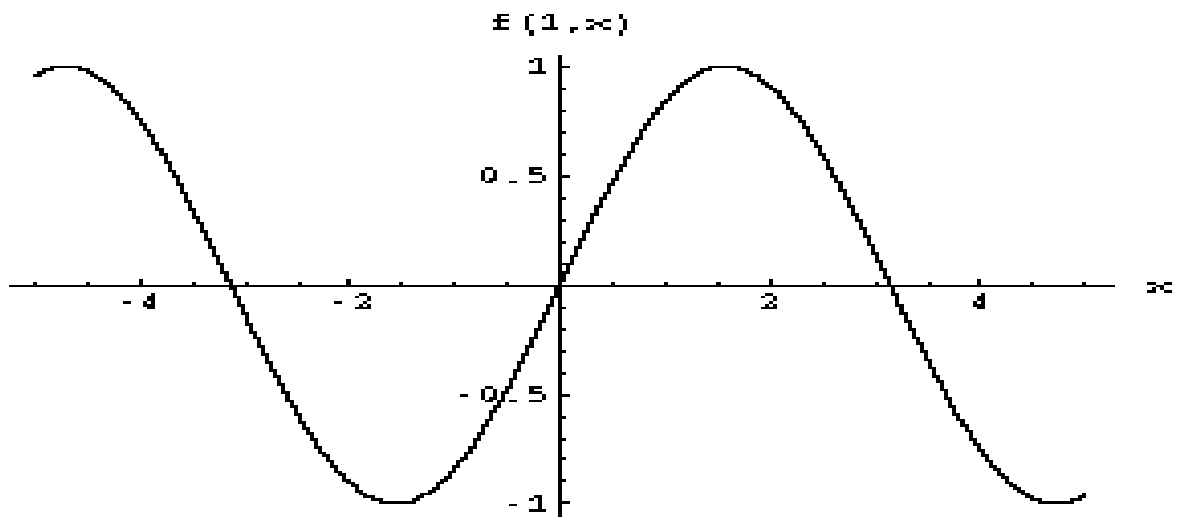
(c) Give an estimation for $f'(2)$, using $h = 0.01$

Answer: _____

(d) Give the exact value for $f'(2)$ using the power rule

Answer: _____

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



7. The cost of extracting T tons of ore from a copper mine is $f(T)$ dollars.
- (a) $f(2000) = 30,000$ What does this equation mean in terms of copper and money?

Answer: _____

- (b) What are the units of measurement of $f'(2000)$?

Answer: _____

- (c) Would you expect $f'(2000)$ to be positive or negative? Justify your answer.

Answer: _____

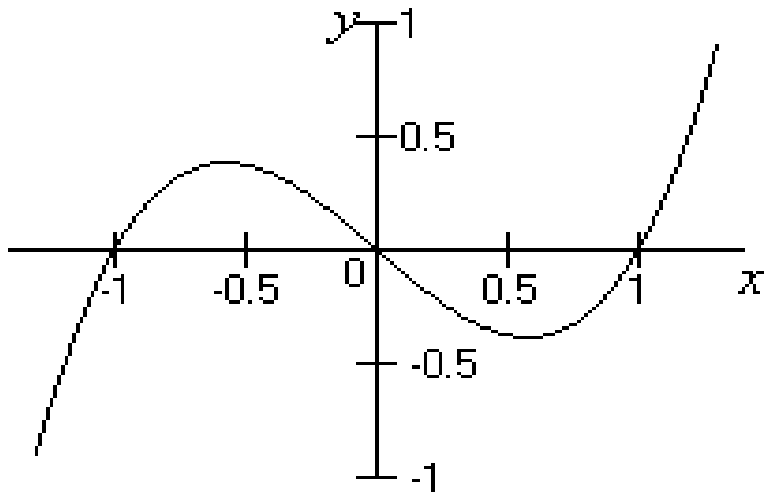
- (d) $f'(2000) = 10$ What does this equation mean in terms of copper and money?

Answer: _____

8. Draw the graph of a function that satisfies the following conditions:

- $g'(x) = 0$ for $x < 0$
- $g'(x) > 0$ for $0 < x < 2$
- $g'(x) < 0$ for $x > 2$

9. Below is the graph of $f'(x)$. Sketch the graph of the original function $f(x)$.
(Note that this question is the opposite of question 6)



10. Consider the function $f(x) = x^2 + 2x + 10$

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

Answer: _____

(b) Give the equations of the tangent line at $x = 2$

Answer: _____

(c) Estimate $f(2.1)$ using the tangent line

Answer: _____