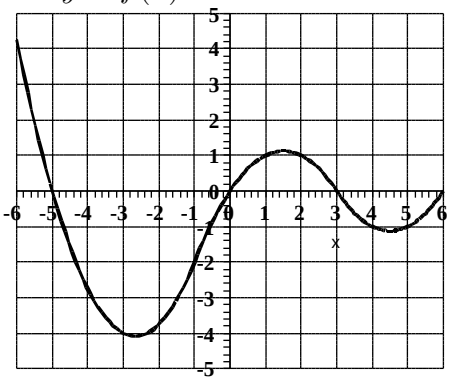
MATH 77 **TEST 1** Name Date

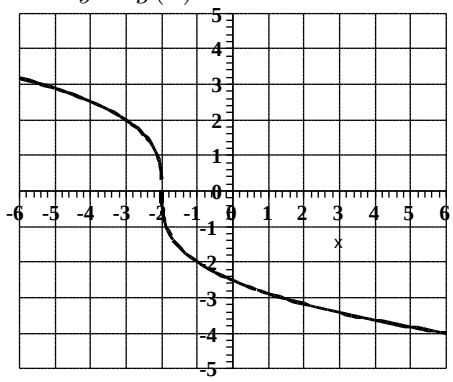
Please show **all your work**. **No work - no credit**.

1. (8*pt*) The graphs of two functions, $g(x)$ and $f(x)$, are given below.

$y = f(x)$



$y = g(x)$



(**a**) $f(g(-3))$

(**b**) $g(f(5))$

Estimate:

(**c**) $f(f(-6))$

(**d**) $g(g(6))$

2. (10*pt*) Given two values of a function $f(x)$, namely, $f(0) = 25$ and $f(1) = 20$, find a formula for this function in each of the following cases:

(**a**) f is a linear function

(**b**) f is an exponential function.

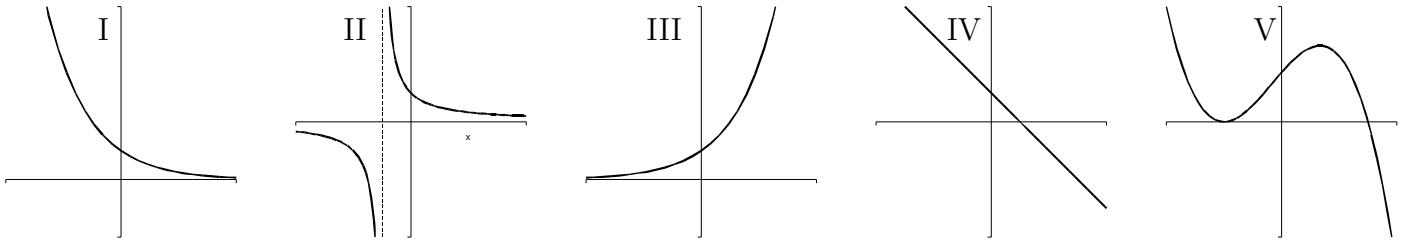
3. (12*pt*) Solve using logarithms.

(**a**) $5^{x+1} = 7$

(**b**) $3e^{x+1} = e^{4x}$

(**c**) $2 \cdot 7^x = e^{3x}$

4. (10*pt*) Match each of the following graphs with its equation:



(**a**) $y = \ln x$

(**b**) $y = 2^x$

(**c**) $y = 1 - \log(10^{-x})$

(**d**) $y = \dfrac{1}{x+1}$

(**e**) $y = -(x+2)^2(x-3)$

(**f**) $y = (0.5)^x$

5. (10*pt*) A car accelerates during 10 seconds. Its distance (in feet) from the starting point, recorded every 2 seconds, is given in the following table:

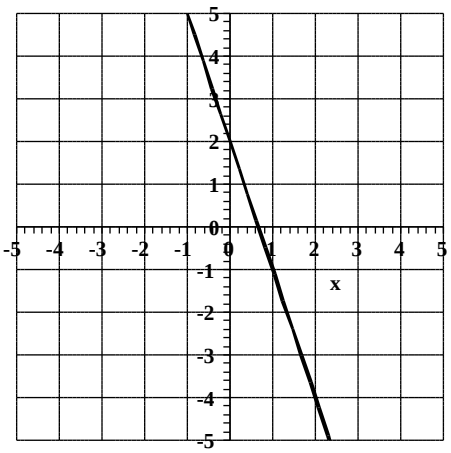
t (sec)	0	2	4	6	8	10
$s(t)$ (feet)	0	20	70	170	330	530

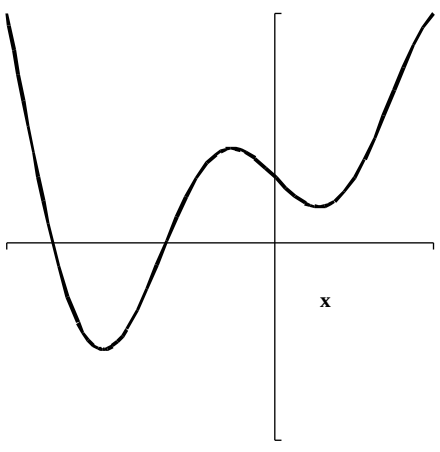
(**a**) Find the average velocity of the car over the interval $0 \leq t \leq 10$. Give the units.

(**b**) Estimate the instantaneous velocity of the car at $t = 3$. Give the units.

(**c**) Estimate the instantaneous velocity of the car at $t = 9$. Give the units.

6. (10*pt*) For each of the functions below, sketch the graph of its derivative on the same axes.





7. (10*pt*) The size (in milligrams) of a doze of a certain drug that must be given to a patient depends on the weight of the patient, W (in pounds). Thus, $D = f(W)$. Use the units to interpret the following:

(**a**) $f(150) = 110$

(**b**) $f'(150) = 3$

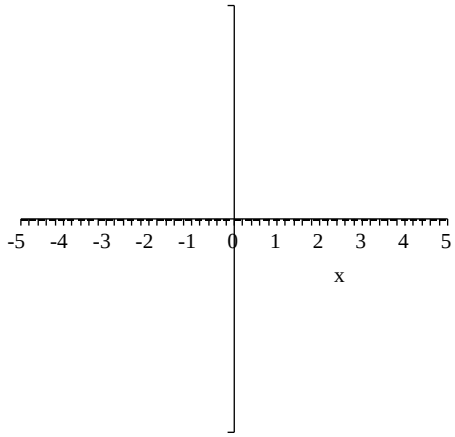
(**c**) W such that $f(W) = 140$

8. (8*pt*) On the axes above, sketch a smooth, continuous curve (i.e., no sharp corners, no breaks) that is the graph of a function $f(x)$ which satisfies all of the following conditions:

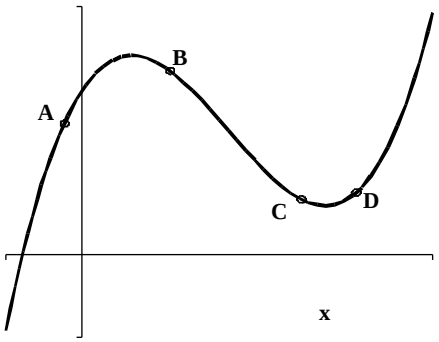
$f'(x) > 0$ for $-5 < x < 5$

$f''(x) < 0$ for $-5 < x < 1$

$f''(x) > 0$ for $1 < x < 5$



9. (8*pt*) For each of the labeled points on the graph of a function f below, fill in the table indicating the signs of f' and f''.



Point	f'	f''
A		
B		
C		
D		

10. (14*pt*) Consider the function $f(x) = 2x^3 - x^2 + 6$

(**a**) Estimate $f'(1)$, using $h = 0.01$.

(**b**) Find the exact derivative function, $f'(x)$, by using differentiation rules.

(**c**) Give the slope-intercept form of the equation of the tangent line to the curve $y = f(x)$ at the point with $x = 1$.

(**d**) Estimate $f(1.1)$ using the tangent line equation. Then compare that approximate value with the exact value of $f(1.1)$.