Math 102	TEST CHAPTERS 3 – 4	Fall 2007
Form B2	Score:	Name:

Show all your work on these papers (you may use the reverse) and BOX your final answers

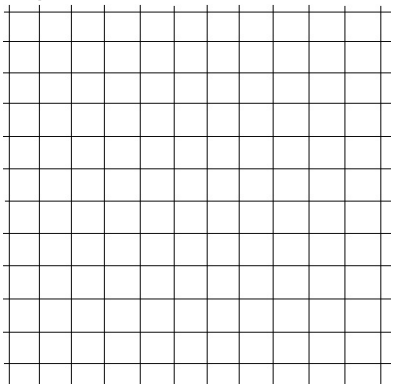
10 1. For $f(x) = x^2 - 5x + 1$, find $\dfrac{f(x+h) - f(x)}{h}$ and simplify completely.

8 3. Let f be the function given by $f(x) = \begin{cases} x^3 & \text{if } x < 0 \\ 2x - 1 & \text{if } x \geq 0 \end{cases}$

a. $f(-2) =$

$f(\frac{1}{2}) =$

b. Sketch the graph of f.



12 4. $g(x) = -\sqrt{x + 4} + 1$

a. Write a sentence describing how the graph of the function g can be obtained from the graph of $y = \sqrt{x}$ using transformations.

b. Sketch the graph.

14 2. Use the graph of the function f at right to answer the following questions.

a. What is f(–2) ?

b. On what interval is $f(x) \geq 0$?

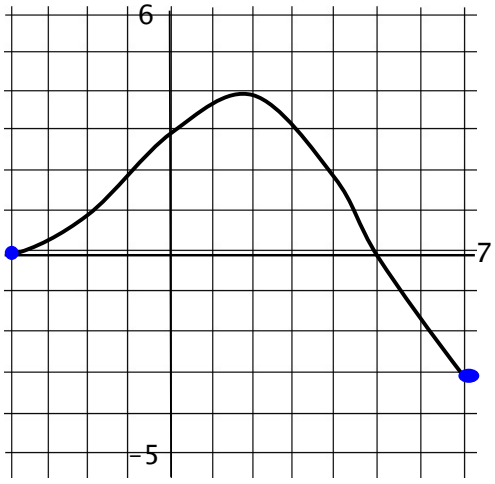
c. What is the range of f ?

d. On what interval(s) is f decreasing ?

e. Does f have any local minimum? If so, where?

f. Does f have any local maximum? If so, where?

g. Find the average rate of change of f on [0,5].



10 5. Consider the quadratic model $h(t) = -16t^2 + 68t + 60$ for the height h (in feet), of an object t seconds after the object has been projected straight up into the air.

a. At what time does the projectile achieve its maximum height?

b. What is its maximum height.

10 6. The monthly cost C, in dollars for usage on a certain cellular phone plan is given by the function $C(t) = .40t + 10$, where t is the number of minutes used.

a. What is the cost if you use just 60 minutes in one month?

b. Suppose you budget yourself for $60 per month for the phone. What is the maximum number of minutes you can talk?

10 7. Let P = (x,y) be a point on the graph of $y = 3x - 3$.

Hint: the distance between two points is given by the formula $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

a. Express the distance from P to the point (0,1) as a function of x.

b. What is the distance between the point on the graph where x=2 and the point (0,1)?

12 8. Let f be the function given by: $f(x) = -x^2 + 4x + 12$

a. Find the vertex of this function

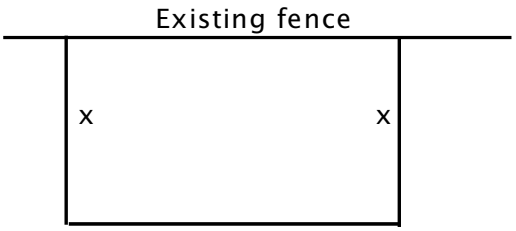
b. Sketch the graph, and label all the important points.

c. Write the equation of the axis of symmetry:

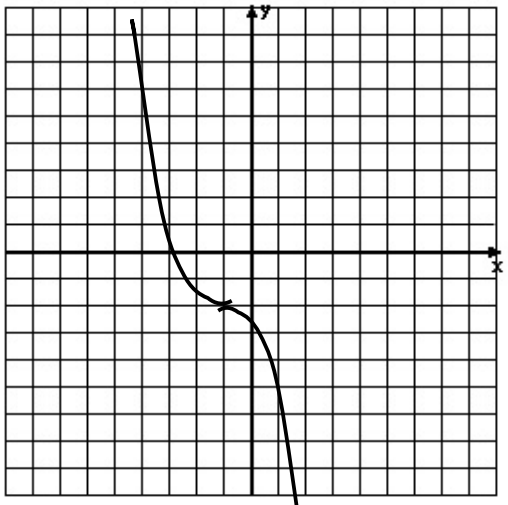
12 9. A rectangular field is to be enclosed with 250 yards of fencing. One side of the field abuts an existing straight fence (and does not need fencing).

a. Express the area of the field, A, as a function of its width x.

b. For what value of x will the area be the greatest?



4 8. Given the function f has the graph shown at left, which of the following could be the function?



a. $f(x) = x^4 - 3$

b. $f(x) = (x-1)^4 - 4$

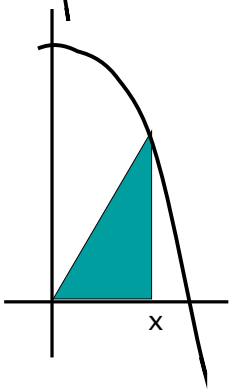
c. $f(x) = -x^3 - 3$

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

e. $f(x) = -(x-1)^3 - 3$

f. $f(x) = -(x+1)^2 - 2$

6 9. A right triangle has a vertex at (0.0), one arm on the positive x-axis, and third vertex on the curve: $y = 4 - x^2$.
Write a function for the area A of this triangle in terms of x.
What is the domain of this function ?



12 10. Two adjacent rectangular fields are to be enclosed with 200 yards of fencing—
The two fields will be identical rectangles, sharing a side (fence) in the middle.
Let x be the length of fence in the middle.

4 a. Express the total area enclosed by the fields in terms of x.

2 b. What is the area when x = 10 ?

4 c. For what value of x will the area be maximum ?

2 d. What is the maximum area ?