

Test #1 · Tuesday 16 September, 2008

MATH 120R · Section 5 · Fall 2008

Instructor: Martin Leslie

Student's Name \_\_\_\_\_

By signing my name below, I agree that I am following all rules and regulations set forth by the Code of Academic Integrity. Furthermore, I agree that I am following all rules set by my instructor and by the course policy for this exam. This includes ensuring that all calculator programs except possibly EVALUATE and QUADRATIC FORMULA have been deleted.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Section I – Short Answer**

Answer in the space provided. Show your work.

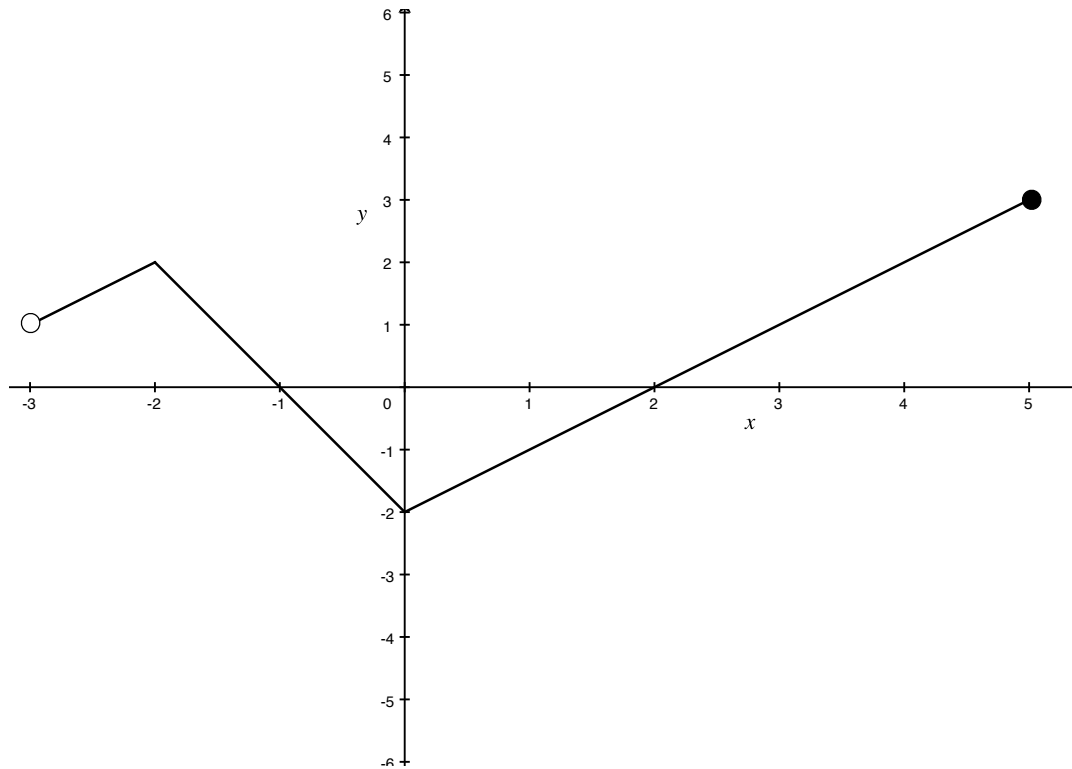
1. Consider the function

$$f(x) = \frac{x^2 - x - 2}{x^2 - 3}.$$

- (a) Find the zeros of this function.

- (b) Find the domain of this function. Express your answer in interval notation.

2. Consider the following graph of  $y = f(x)$ .

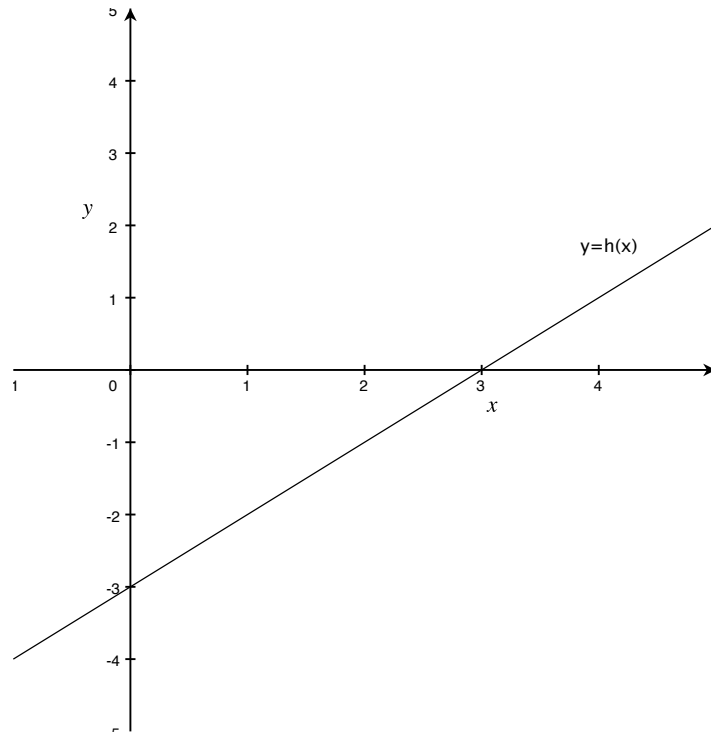


Determine:

- The domain of  $f$ .
- The range of  $f$ .
- The  $x$ -intercept(s).
- Interval(s) where the function is positive.
- Open interval(s) where the function is increasing.
- Turning point(s) of the function.

3. Functions  $f$ ,  $g$  and  $h$  are defined by  $f(x) = x^2 + 2x - 4$ , and the following table and graph

$x$	$g(x)$
1	2
2	4
3	4
4	5



Determine:

(a)  $(f + g)(2)$

(b)  $(f \circ h)(2)$

(c)  $(\frac{g}{h})(2)$

4. Let  $f(x) = 2x^2 - 3x + 1$ . Find  $\frac{f(x+h) - f(x)}{h}$ .

5. (a) Describe the transformations (in the order that they are applied) of the base function  $y = x^3$  that produce the function  $y = -(x - 1)^3$ .

(b) Use part (a) to graph  $y = -(x - 1)^3$ .

6. Sketch a graph of the piecewise defined function given by

$$f(x) = \begin{cases} -x & \text{for } x \leq 0 \\ x^2 + 2 & \text{for } x > 0. \end{cases}$$

7. Let  $f(x) = \sqrt{x-2}$  and  $g(x) = x^2 - 9$ . Find the domain of the function  $\frac{f}{g}$ .

8. The equation  $x^2 + y^2 - 2y - 8 = 0$  describes a circle. By completing the square, find the center and radius of this circle.

9. Suppose that the total cost of purchasing a home is the sum of the selling price, a 5% sales tax and a processing fee of \$2000.

(a) Show that the total cost of purchasing a house with selling price  $x$  is given by the function

$$f(x) = 1.05x + 2000.$$

(b) Explain why  $f(x)$  is one-to-one. (You can do this either graphically or algebraically).

(c) Find the inverse function  $f^{-1}$ .

(d) Calculate  $f^{-1}(100000)$ . Explain what your answer means in terms of purchasing a home.

### Section II – Multiple Choice

Circle the correct answer. No partial credit will be given.

1. Which of the following tables determine  $y$  as a function of  $x$ ?

(1) 

$x$	$y$
1	0
2	1
3	4
5	4

(2) 

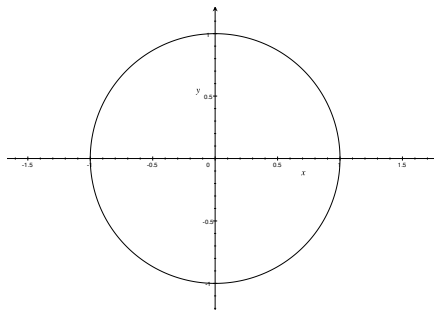
$x$	$y$
2	9
4	5
5	3
4	5

(3) 

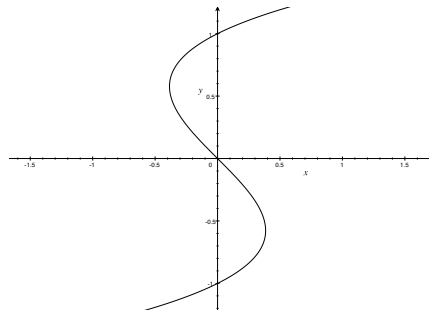
$x$	$y$
5	2
6	3
7	5
5	6

- (A) All of them      (B) 1 and 2 only      (C) 2 only  
 (D) 1 and 3 only      (E) 2 and 3 only

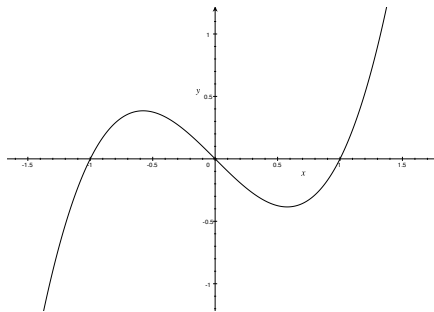
2. Which of the following is/are graphs of functions?



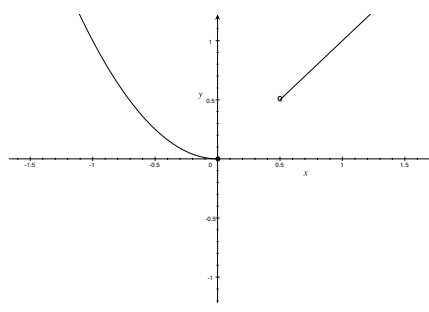
(1)



(2)



(3)



(4)

- (A) All of them      (B) 3 only      (C) 2 and 3 only  
 (D) 2 and 4 only      (E) 3 and 4 only

3. The temperature of a solution in a lab experiment is given by

$$F(t) = 0.16t^2 - 1.6t + 35$$

where  $t$  is measured in hours and  $F$  is the temperature in degrees celsius.

Which of the following is the rate of change of the temperature of the solution between  $t = 2$  hours and  $t = 4$  hours?

- (A)  $0^\circ\text{C}/\text{hour}$       (B)  $0.64^\circ\text{C}/\text{hour}$       (C)  $-0.64^\circ\text{C}/\text{hour}$   
(D)  $1.28^\circ\text{C}/\text{hour}$       (E)  $-1.28^\circ\text{C}/\text{hour}$