

Test #2 · Tuesday 14 October, 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. Solve  $|2x - 3| = 4$ .

2. In the Stawell Gift (an Australian running race) runners start at a distance in front of the starting line determined by race officials depending on their abilities. If the distance in meters,  $d$ , that a runner is from the starting line  $t$  seconds after the race begins is given by

$$d = 9t + 6$$

explain what units the quantities 9 and 6 are measured in and what they mean in the context of the race.

3. Consider the polynomial function  $f(x) = 2(x - 2)^3(x + 1)$ .

(a) What is the leading term of  $f(x)$ ?

(b) Find the  $x$  and  $y$  intercepts of the graph of  $y = f(x)$ .

(c) Graph  $y = f(x)$ .

(d) Use your graph to solve the inequality  $f(x) \geq 0$ .

4. A manufacturer of music players knows that their profit,  $P$ , is a function of the number of players manufactured and sold per day,  $x$ , and is given by

$$P(x) = -2x^2 + 120x - 1000.$$

- (a) By completing the square, sketch a graph of profit as a function of the number of players sold. Find and label the  $x$  and  $y$  intercepts as well as the vertex.

- (b) In a few sentences, explain the significance of the coordinates of the  $x$  intercepts and turning point of your graph in the context of manufacturing music players.

5. The perimeter of a rectangle is 70 inches. If the width is doubled and the length is tripled the new perimeter would be 180 inches. Find the dimensions of the original rectangle.

6. A right angled triangle has hypotenuse 10 inches long. Let  $s$  be the length of one of the other sides. Express the area of the triangle as a function of  $s$ .

7. Consider the reduced rational function  $f(x) = \frac{2x^2 - 2x - 4}{x^2 - 3x}$ .

(a) Divide  $p(x) = 2x^2 - 2x - 4$  by  $d(x) = x^2 - 3x$ . Give your answer in the form

$$\frac{p(x)}{d(x)} = q(x) + \frac{R(x)}{d(x)}.$$

(b) Find all intercepts of  $f$ .

(c) Find all asymptotes of  $f$ .

(d) Graph  $y = f(x)$ . Make sure to label all the asymptotes and intercepts you found above.

8. A piece of wire 10cm long is cut into two pieces. Let the length of the first piece be  $x$  and the length of the second be  $10 - x$ . The first piece is formed into a rectangle with length three times its width and the second is formed into a square.

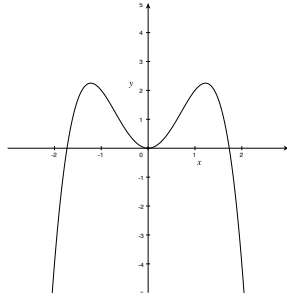
(a) Find the total area of the two shapes as a function of  $x$ .

(b) For which  $x$  is the total area a minimum?

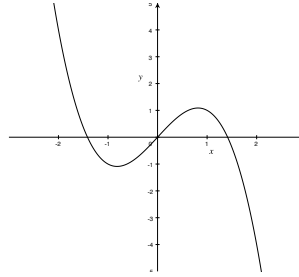
### Section II – Multiple Choice

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

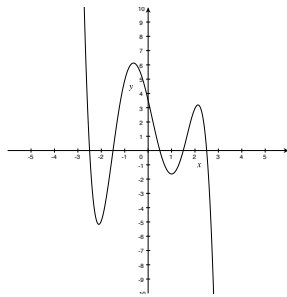
1. Which of the following graphs could be a graph of a polynomial of degree 3 with a negative leading coefficient?



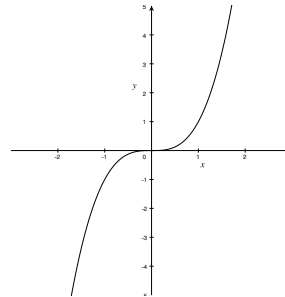
(1)



(2)



(3)



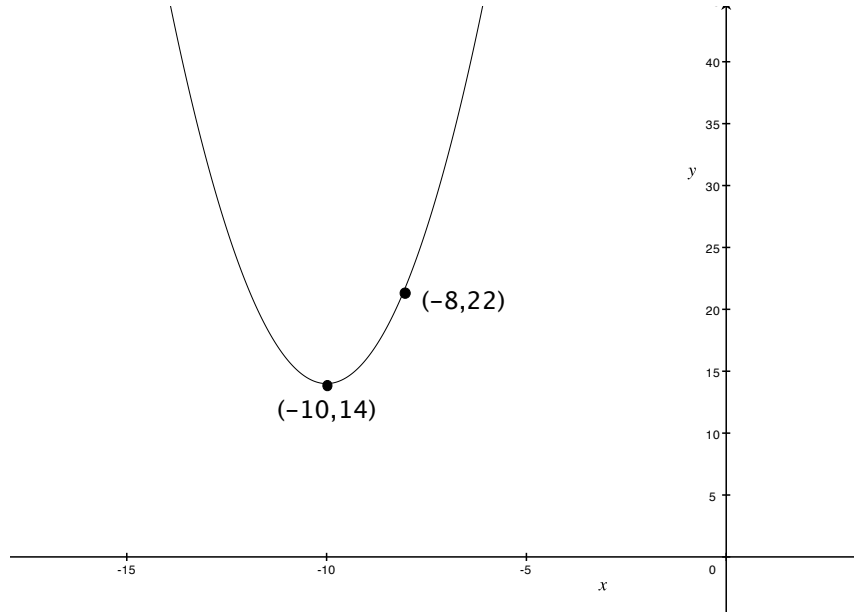
(4)

- (A) 1 only      (B) 2 only      (C) 4 only  
 (D) 2 and 4 only      (E) 1, 3 and 4 only

2. What is the equation of the line which goes through the point  $(9, 2)$  and is perpendicular to the line  $y = 3x + 4$ ?

- (A)  $y = 3x + 29$       (B)  $y = \frac{1}{3}x - 1$       (C)  $y = -\frac{1}{3}x + 1$   
 (D)  $y = -\frac{1}{3}x - 5$       (E)  $y = -\frac{1}{3}x + 5$

3. Find the equation of the quadratic function graphed below.



(A)  $y = (x + 10)^2 + 14$

(B)  $y = (x - 10)^2 + 14$

(C)  $y = 2(x + 10)^2 + 14$

(D)  $y = 22(x + 10)^2 + 14$

(E)  $y = (x + 8)^2 + 22$