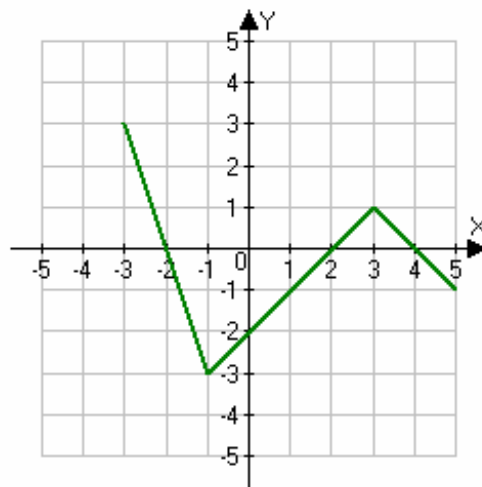


Show all work on the test paper for partial credit.

(7 points)

1. Approximate the following for the given function.

- a. Where is  $f(x) = 0$ ?
- b. Where is  $f(x) > 0$ ?
- c. Where is  $f(x) < 0$ ?
- d. Where is  $f(x)$  increasing?
- e. Where is  $f(x)$  decreasing?
- f. If  $f(x)$  has a maximum, where does the maximum occur and what is the maximum?
- g. If  $f(x)$  has a minimum, where does the minimum occur and what is the minimum?



a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

e. \_\_\_\_\_

f. \_\_\_\_\_

g. \_\_\_\_\_

**(5 points)**

2. The median price of a home in Fort Worth, Texas for the years 2003 and 2004 are shown in the table below. Use the data to answer the following questions:

|                   | <i>2003</i> | <i>2004</i> |
|-------------------|-------------|-------------|
| <b>Fort Worth</b> | 90,707      | 97,062      |

- a) Write a linear function that relates cost of a home in Fort Worth to the year.
- b) Interpret the slope and y-intercept in terms of the variables given.
- c) Use the function to estimate the price of a home in Fort Worth in 2008.

**(5 points)**

3. For the function  $g(x) = 12.37x + 23.3$ , find the value of  $x$  for which  $g(x) = -11.1$ .

**(5 points)**

4. Solve **symbolically** and check your solution.

$$0.5(3.2t - 1.1) - .5(3t - 1) = 0.25(2t - 3)$$

**(6 points)**

5. The tax,  $T$ , paid by a shopper varies directly as the amount of the purchase,  $p$ , made by the shopper. If the tax paid for a \$180 purchase is \$13.50, find the following:

a) the constant of proportionality,

b) the equation of variation, and

c) the tax on a purchase of \$500.

**(4 points)**

6. The percent of Americans who smoke can be modeled by the function  $S(t) = -0.59t + 42.28$  where  $t$  represents the number of years since 1965. Determine the years for which the percent of Americans who smoke is less than 18 percent.

**(4 points)**

7. Matthew works at an appliance store on commission. He receives a weekly salary of \$850 plus 8% of any merchandise he sells.
- Write a function that gives his gross wages,  $W$ , in terms of his total sales in dollars,  $x$ .
  - How much will he earn if he sells \$4,000 of merchandise in a week?
  - How much does he have to sell to earn \$1,250?

**(4 points)**

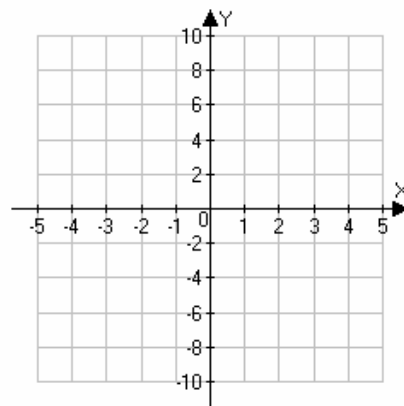
8. Solve symbolically:  $-4 < \frac{3-x}{4} < 5$ . Express the solution using interval notation. Check your work

**(6 points)**

9. For the following piecewise-defined function  $f(x) = \begin{cases} -2x & -4 < x \leq 0 \\ 2 & 0 < x < 2 \\ 2x - 3 & 2 \leq x < 4 \end{cases}$  answer the following

questions:

- Find the domain of  $f$ .
- Evaluate at  $x = -2, -1, 0, 1, 2$ .
- Sketch a graph.
- Is  $f$  continuous? Explain.
- Find the values where  $f(x) = 0$ .



**(8 points)**

10. a. Solve:  $|3 - 2x| = \frac{2}{5}$

b. Solve:  $|3 - 2x| \leq \frac{2}{5}$

**(4 points)**

11. Write the function  $f(x) = 2x^2 - 12x + 14$  in vertex form and identify the vertex. Find the range of the function.

**(4 points)**

12. List the transformations used to obtain the graph of  $g(x) = \frac{3}{2}(x-2)^2 - 4$  from  $f(x) = x^2$  and draw the graph of  $g$ .

**(4 points)**

13. Find values for  $a$ ,  $h$ , and  $k$  so that the function  $f(x) = a(x-h)^2 + k$  that models the data exactly:

|        |     |    |    |    |     |
|--------|-----|----|----|----|-----|
| $x$    | -3  | -2 | -1 | 0  | 1   |
| $f(x)$ | -11 | -5 | -3 | -5 | -11 |

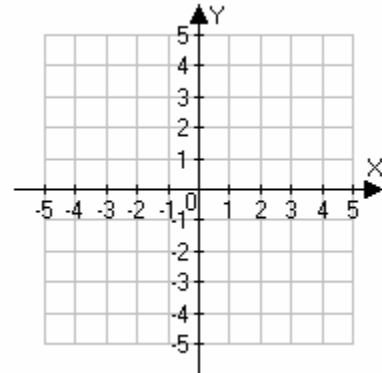
**(6 points)**

14. Put the quadratic function  $f(x) = x^2 + 4x + 1$  in vertex form and graph.

a) What transformations are used to transform the graph of  $g(x) = x^2$  into this graph?

b) What is the axis of symmetry of the graph of  $f$ ?

c) What is the vertex of the graph? Label this clearly



d) The vertex form of the quadratic function

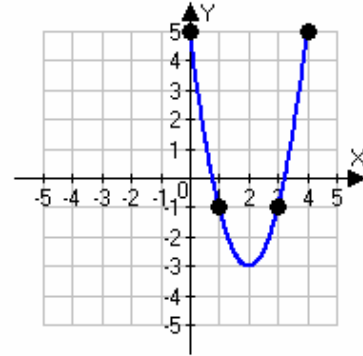
e) Intervals where the function is increasing

f) Intervals where the function is decreasing

**(6 points)**

15. Use the graph of the quadratic function below to determine the following:

- a) Vertex
- b) Axis of symmetry
- c) Sign of the leading coefficient
- d) The **vertex form** of the quadratic function
- e) Intervals where the function is increasing
- f) Intervals where the function is decreasing



**(4 points)**

16. A company is going to produce a new product. Its marketing department has estimated that the revenue for the new product will be given by the equation  $R(x) = 300x - 0.0003x^2$ . Where  $x$  is the number of units produced and  $R$  is the revenue measured in dollars. Find the following:

a) The number of units that produces the maximum revenue.

b) The maximum revenue.

c) The cost of producing  $x$  units of the new product is given by  $C(x) = 60x + 2200$ . Find the profit function  $P(x)$  which is given by  $P(x) = R(x) - C(x)$ .

d) Find the number of units to produce to yield the maximum profit.

Solve the following quadratic equations. (6 points)

17.  $2x^2 + 7x = 15$

18.  $2x^2 - 7x + 3 = 0$

(3 points)

19. The graph of  $f(x) = ax^2 + bx + c$  is given in the figure below. Solve the equation  $ax^2 + bx + c = 0$ .

