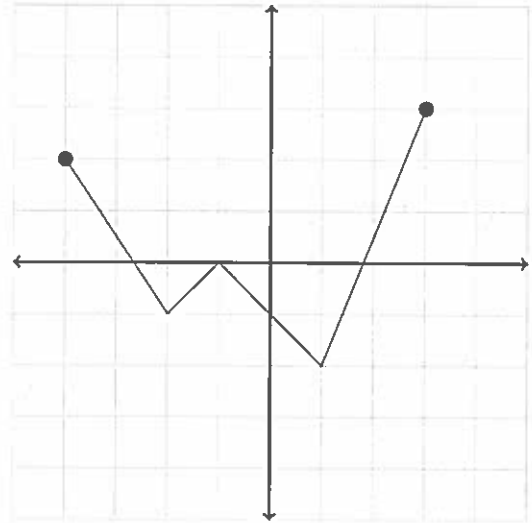


# Solutions

Name: \_\_\_\_\_

This quiz is worth 50 points. There are 6 questions and you have 30 minutes to complete them. Attempt all questions and show all *necessary* work. Do not just word vomit. If you get stuck and cannot answer a question, write down, using words, what you would *like* to do and you may receive partial credit. Any questions, just ask. Calculators are **not** allowed.

1. (16 points) Consider graphed function to the right.



(a) What is the domain of this function?

Answer:  $[-4, 3]$

(b) What is the range of this function?

Answer:  $[-2, 3]$

(c) Does this function have a *local* maximum? If so give the coordinates. (If you think there are more than one, just pick one of them)

Answer:  $(-1, 0)$

(d) Does this function have a *local* minimum? If so give the coordinates. (If you think there are more than one, just pick one of them)

Answer:  $(-2, -1)$

(e) Does this function have a *global* maximum? If so give the coordinates.

Answer:  $(3, 3)$

(f) Does this function have a *global* minimum? If so give the coordinates.

Answer:  $(1, -2)$

(g) Give an interval where the function is *increasing*. (If you think there are more than one, just pick one of them)

Answer:  $(1, 3)$

(h) Give an interval where the function is *decreasing*. (If you think there are more than one, just pick one of them)

Answer:  $(-4, -2)$

2. (6 points) A tee shirt company makes tee shirts with school logos. The company charges a fixed fee of \$200 to set up the machines plus \$3.50 per tee shirt.

(a) Find a function  $C$  that models the cost of purchasing  $x$  tee shirts.

Answer:  $C(x) = 200 + 3.5x$

(b) Use the model to find the cost of purchasing 200 tee shirts.

$$200 + 3.5(200)$$

Answer: \$900

3. (3 points) Weather balloons are filled with hydrogen and released at various sites to measure and transmit data such as air pressure and temperature. A weather balloon is filled with hydrogen at a rate of  $0.5\text{ft}^3/\text{s}$ . Initially, the balloon has  $2\text{ft}^3$  of hydrogen. Find a linear function that models the volume of the hydrogen in the balloon after  $t$  seconds.

Answer:  $V(t) = 2 + 0.5t$

4. (15 points) Find an equation of the line that satisfies the given conditions. You may leave your answer in either point-slope or slope-intercept form.

(a) Slope 5,  $y$ -intercept 2

Answer:  $y = 5x + 2$

(b) Slope 2, through  $(0, 4)$

Answer:  $y = 2x + 4$

(c) Through the points  $(-2, 1)$  and  $(4, 7)$

$$\frac{7-1}{4+2} = \frac{6}{6} = 1$$

Answer:  $y = x + 3$

(d) Through  $(-1, 2)$ , *parallel* to the line  $y = 4x + 7$

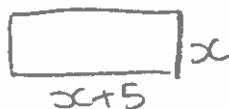
Answer:  $y - 2 = 4(x + 1)$

(e) Through  $(2, 6)$ , *perpendicular* to the line  $y = \frac{1}{2}x + 1$

Answer:  $y - 6 = -2(x - 2)$

5. (5 points) A graphic artist needs to construct a design that uses a rectangle whose length is 5cm longer than its width  $x$ .

(a) Construct a model that gives the perimeter of the rectangle.



Answer:  $P(x) = 4x + 10$

(b) If the perimeter of the rectangle is 26cm, what are the dimensions of the rectangle?

$$4x + 10 = 26$$

$$x = 4$$

Answer:  $4 \times 9$

6. (5 points) In the latter part of the 20th century the united states experienced a large population shift from the cities to the suburbs. This is true of Atlanta, for example, whose population grew steadily for its first hundred years, then began to decline. Within the last two decades Atlanta's population has started to rise again, as seen in the table.

Year	Population	Year	Population
1850	2,600	1930	270,700
1860	9,500	1940	302,300
1870	21,800	1950	331,000
1880	37,400	1960	487,000
1890	65,500	1970	497,000
1900	89,900	1980	425,000
1910	154,800	1990	394,000
1920	200,600	2000	416,500

Find the average rate of change of the population of Atlanta between the following years:

(a) 1850 and 1950.

$$\frac{331,000 - 2,600}{1950 - 1850} = \frac{328,400}{100}$$

Answer:  $3,284$

(b) 1950 and 1970.

$$\frac{497,000 - 331,000}{1970 - 1950} = \frac{166,000}{20}$$

Answer:  $8,300$

