

Kery

Each problem is worth 10 points each.

1. A child at age 2, weighs 28 pounds. At age 10, she weighs 60 pounds.

a) Write ordered pairs to describe this data.

$$(2, 28) \quad (10, 60)$$

b) Find the equation of the line passing through these points.

$$m = \frac{60 - 28}{10 - 2} = \frac{32}{8} = 4$$

$$y - 28 = 4(x - 2) = 4x - 8$$

$$y = 4x + 20$$

c) Use the equation in part b) to estimate the child's weight at age 7.

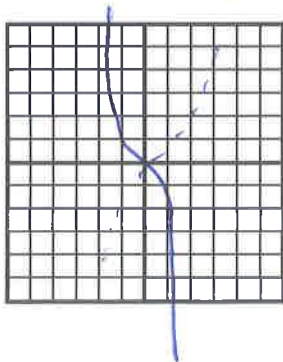
$$y = 4(7) + 20 = 28 + 20 = 48$$

d) (Bonus): What does the slope in this problem represent in real life?

4 lb/year - she gains 4 pounds per year

2. For the function $f(x) = -x^3$

a) Graph $f(x)$

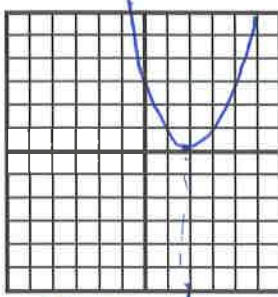


b) Circle all of the following properties that apply to $f(x)$

- x-axis symmetric
- y-axis symmetric
- origin symmetric
- none of these

3. For the function $f(x) = (x - 2)^2$

a) Graph $f(x)$



b) State any interval(s) where $f(x)$ is increasing.

$$(2, \infty)$$

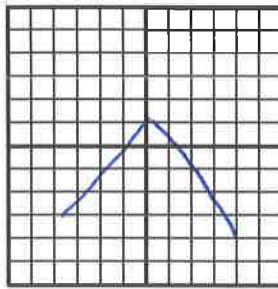
c) State any interval(s) where $f(x)$ is decreasing.

$$(-\infty, 2)$$

d) Is $f(x)$ one-to-one? *no*

4. For the function $f(x) = -|x| + 1$

a) Graph $f(x)$



b) State the domain:

$$(-\infty, \infty)$$

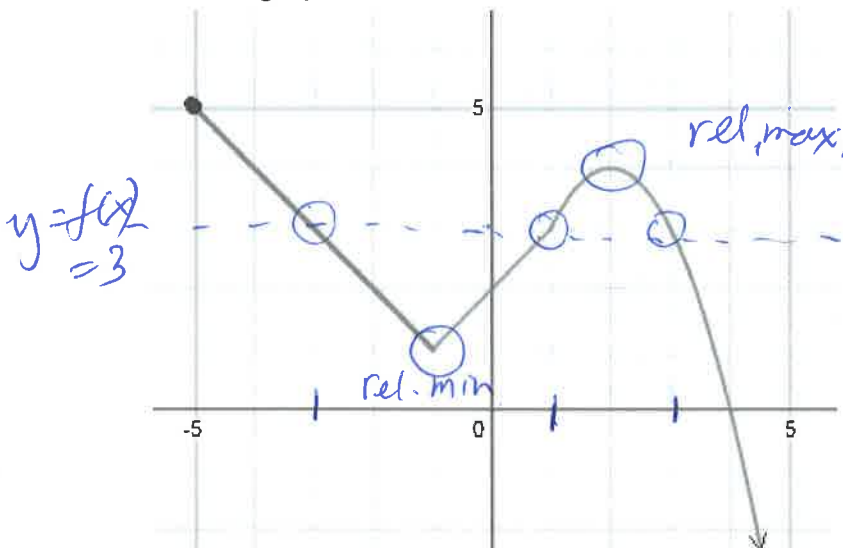
c) State the range:

$$(-\infty, 1]$$

d) Circle all of the following properties that apply to $f(x)$

- odd function
- even function
- none of these

5. For the graph below:



a) Give the domain

$$[-5, \infty)$$

b) Give the range

$$(-\infty, 5]$$

c) Give the value(s) of any relative minima

$$1$$

d) Give the value(s) of any relative maxima

$$4$$

e) Find all values of x where $f(x) = 3$

$$x = -3, x = 1, x = 3$$

6. For the function $f(x) = \sqrt{x} + 3$

a) Find $f(1)$ and $f(9)$

$$f(1) = \sqrt{1} + 3 = 4$$

$$f(9) = \sqrt{9} + 3 = 3 + 3 = 6$$

$$x_1 \quad y_1 \\ \rightarrow (1, 4)$$

$$\rightarrow (9, 6) \\ x_2 \quad y_2$$

b) Find the average rate of change from $x = 1$ to $x = 9$

avg rate of change = slope

$$m = \frac{6 - 4}{9 - 1} = \frac{2}{8} = \frac{1}{4}$$

c) What mathematical quantity is equivalent to "rate of change" (what is another word for "rate of change")?

slope

7. For $f(x) = 5\sqrt{x+2}$ and $g(x) = 4x - 1$

a) Find the composition: $f \circ g(x) = f(g(x))$

$$f(g(x)) = 5\sqrt{4x-1} + 2 = 5\sqrt{4x+1}$$

b) Find the composition: $g \circ f(7) = g(f(7))$

$$g(f(7)) = g(15) = 4(15) - 1 = 60 - 1 = 59$$

$$f(7) = 5\sqrt{7+2} = 5\sqrt{9} = 5 \cdot 3 = 15$$

8. a) Find the inverse, $f^{-1}(x)$ of the function $f(x) = 2x - 6$

$$y = 2x - 6$$

$$x = \frac{y + 6}{2}$$

$$\frac{x + 6}{2} = \frac{y}{2}$$

$$y = f^{-1}(x) = \frac{x + 6}{2}$$

$$\text{or } f^{-1}(x) = \frac{x}{2} + 3$$

- b) What is the domain of $f(x)$?

$$(-\infty, \infty)$$

- c) What is the domain of $f^{-1}(x)$?

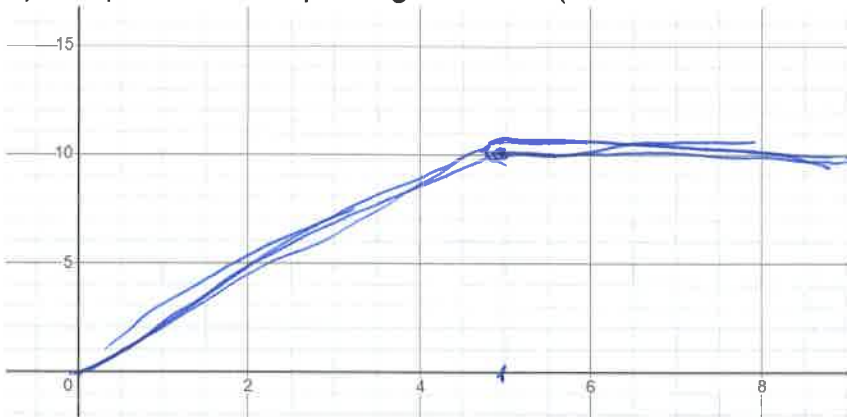
$$(-\infty, \infty)$$

9. A parking garage charges \$2/hour for the first 5 hours. After 5 hours, a flat rate of \$10 is charged.

- a) Write a piecewise function, $C(x)$, to describe the cost of parking.

$$C(x) = \begin{cases} 2x & \text{for } 0 \leq x \leq 5 \\ 10 & \text{for } x > 5 \end{cases}$$

- b) Graph the cost of parking over time (axes are not the same scale)



10. a) Write the inequality $x \geq -2$ in

- set-builder notation

$$\{x \mid x \geq -2\}$$

- interval notation

$$[-2, \infty)$$



b) For the piecewise function

$$C(x) = \begin{cases} 5 & \text{for } x < -2 \\ x - 1 & \text{for } x \geq -2 \end{cases}$$

- Find $C(-3) = 5$
- Find $C(-2) = -2 - 1 = -3$
- Find $C(4) = 4 - 1 = 3$

