

PC-1 Review

1) Algebraically find the domain of the following functions.

a) $h(x) = \frac{3x}{x^2-16}$

$$x^2 - 16 = 0$$

$$\sqrt{x^2} = \sqrt{16}$$

$$x = 4 \quad x = -4$$

$$D: \{x \mid x \neq 4, x \neq -4\}$$

b) $f(x) = \frac{4}{x^2-5x}$

$$x^2 - 5x = 0$$

$$x(x-5) = 0$$

$$\downarrow \quad \downarrow$$

$$x=0 \quad x-5=0$$

$$x=5$$

$$D: \{x \mid x \neq 0, x \neq 5\}$$

c) $g(x) = \sqrt{9x+7}$

$$9x+7 \geq 0$$

$$9x \geq -7$$

$$x \geq -\frac{7}{9}$$

$$D: \{x \mid x \geq -\frac{7}{9}\}$$

2) The graph of $g(x)$ is shown below. Approximate where needed.

a) Evaluate $g(0) = -4$

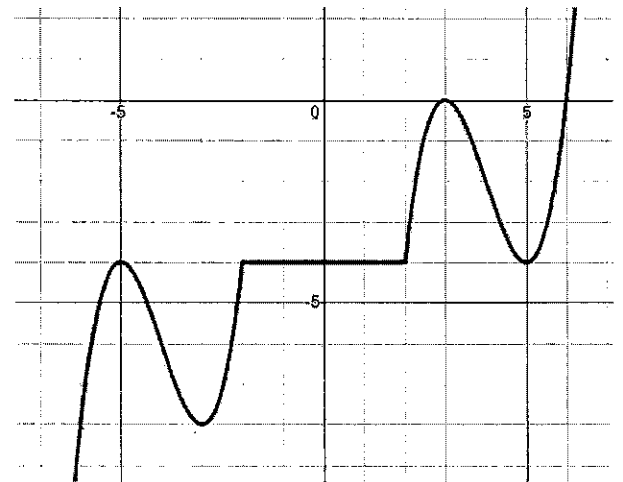
b) Evaluate $g(3) = 0$

c) Solve $g(x) = -8$. Write as a set.

$$x = \{-6, -3\}$$

d) Based on the graph, determine if $g(x)$ is even, odd, or neither. Explain your answer.

Neither. The graph is not symmetric over the y-axis or around the origin.



Determine if the function is even, odd, or neither.

3) $G(x) = \frac{3x}{1+x^2}$

$$G(-x) = \frac{3(-x)}{1+(-x)^2} = \frac{-3x}{1+x^2}$$

$$-G(x) = -\left(\frac{3x}{1+x^2}\right) = \frac{-3x}{1+x^2}$$

ODD because

$$G(-x) = -G(x)$$

Determine if the function is even, odd, or neither.

4) $f(x) = x^4 - 4x^8$

$$f(-x) = (-x)^4 - 4(-x)^8$$

$$= x^4 - 4x^8$$

Even because

$$f(-x) = f(x)$$

5) Use the graph to the right to answer the following:

a) At what value(s) of x , if any does the graph of f have a local maximum?

$$x = \{3\}$$

b) List the local maximum values.

0

c) At what value(s) of x , if any does the graph of f have a local minimum?

$$x = \{-1.294, 5.794\}$$

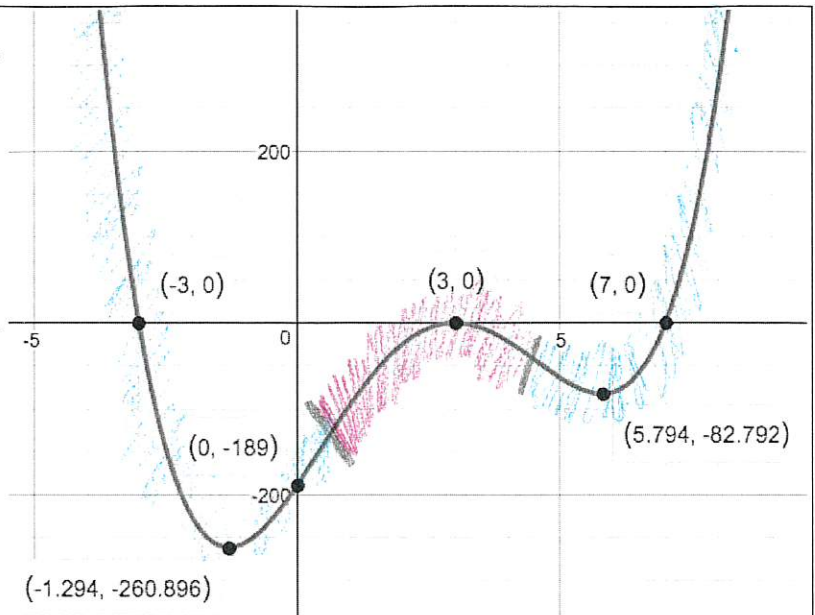
d) List the local minimum values.

$$-260.896, -82.792$$

e) Identify intervals for which the graph is increasing/decreasing.

Increasing: $(-1.294, 3) \cup (5.794, \infty)$

Decreasing: $(-\infty, -1.294) \cup (3, 5.794)$

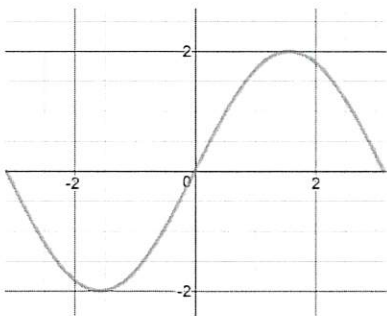


f) Identify intervals for which the graph is concave up/down.

Concave Up: $(-\infty, 0.853) \cup (4.397, \infty)$

Concave Down: $(0.853, 4.397)$

6) Determine if the function is even, odd, or neither. Explain your answer.



ODD because it has rotational symmetry around the origin.

7) Let $f(x) = 3x^3 + 2x^2$

Evaluate $f(-2)$

$$\begin{aligned} f(-2) &= 3(-2)^3 + 2(-2)^2 \\ &= 3(-8) + 8 \\ &= -24 + 8 \end{aligned}$$

$$f(-2) = -16$$

8) Let $f(x) = 3x^3 + 2x^2$

Solve $f(x) = 0$

$$0 = 3x^3 + 2x^2$$

$$0 = x^2(3x + 2)$$

$$0 = x^2 \quad 3x + 2 = 0$$

$$3x = -2$$

$$x = -2/3$$

$$0 = x$$

$$x = \{0, -2/3\}$$

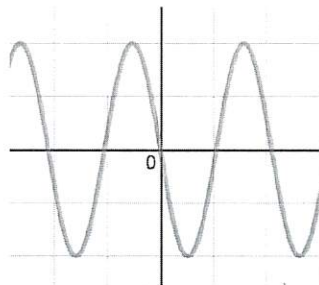
Determine if the following relations are well-defined functions. Explain why or why not.

9.

$$\{(2, 5), (4, 7), (3, 4), (3, 4)\}$$

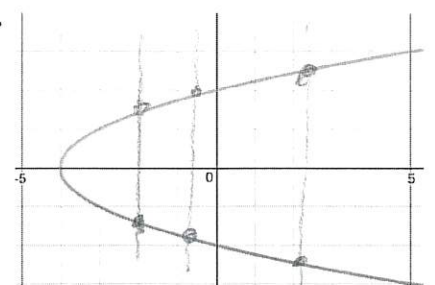
Yes, each input has exactly one output.

10.



Yes, each input has exactly one output.

11.



No! Multiple inputs have two outputs!