

1. Determine whether the relation below represents a function. What is the domain and what is the range?

$\{(-3,6), (7,5), (4,9), (7,5)\}$

3B - "Not"

Actually,

4B - "IS"

it IS. I just

D-1

listed (7,5)

R-1

twice.

~~Not~~

$D = \{-3, 7, 4\}$

$R = \{6, 5, 9\}$

2. (5 pts) Determine whether the equation $x^2 + y^2 = 9$ defines y as a function of x . If it does not, show/explain why not.

$y^2 = 9 - x^2$

$M = 69\%$

$V = 13.8$

$y = \pm \sqrt{9 - x^2}$

Two y -values for each x -value.

$\frac{42}{45} = \frac{14}{15}$

3. Let $f(x) = \frac{4}{\sqrt{x-3}}$. Determine the following, if possible. If not possible, state why:

a. (2 pts) $f(2)$ ~~is~~ $2 \notin D$ b/c $\sqrt{\text{negative}}$

b. (2 pts) $f(3)$ ~~is~~ $3 \notin D$ b/c $\frac{4}{0}$

c. (2 pts) $f(4) = \frac{4}{\sqrt{4-3}} = \frac{4}{1} = 4 = f(4)$

4. (7 pts) Find the domain of $g(x) = \frac{x^2 + 5x + 17}{x^2 - 5x - 6}$

$x^2 - 5x - 6 \neq 0$

$\{x \mid x \neq 6 \text{ and } x \neq -1\}$

$(x-6)(x+1) \neq 0$

$x \neq 6 \text{ and } x \neq -1$

$= \mathbb{R} \setminus \{-1, 6\}$

Factor 4
State Domain 3

5. (4 pts) Let $f(x) = 2x^2$. Find the average rate of change of f from $x = -1$ to $x = 1$.

$\frac{f(1) - f(-1)}{1 - (-1)} = \frac{2(1)^2 - 2(-1)^2}{2} = \frac{2 - 2}{2} = 0$

6. Let $f(x) = \sqrt{x+6}$ and $g(x) = 5x+2$.

a. (5 pts) Determine the domain of f .

$$D = [-6, \infty)$$

b. (5 pts) Determine the domain of g .

$$D = \mathbb{R}$$

c. Find the following functions and state the domain of each.

i. (3 pts) $(f+g)(x)$

$$\sqrt{x+6} + 5x+2 \quad D = [-6, \infty)$$

ii. (3 pts) $(f \cdot g)(x)$

$$\sqrt{x+6} (5x+2) \quad D = [-6, \infty)$$

iii. (3 pts) $\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x+6}}{5x+2}$

$$5x+2 \neq 0$$

$$5x \neq -2$$

$$x \neq -\frac{2}{5}$$

$$D = [-6, -\frac{2}{5}) \cup (-\frac{2}{5}, \infty)$$

$$= \left\{ x \mid x \geq -6 \text{ and } x \neq -\frac{2}{5} \right\}$$

7. Determine algebraically whether each function is even, odd, or neither.

a. (2 pts) $h(x) = 4x^2 + 6x - 2$

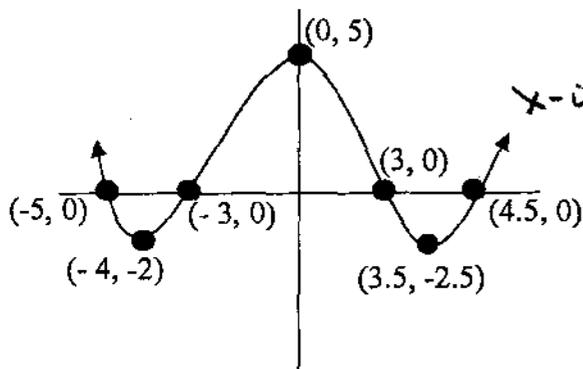
Neither

$$\begin{aligned} h(-x) &= 4(-x)^2 + 6(-x) - 2 \\ &= 4x^2 - 6x - 2 \end{aligned}$$

b. (2 pts) $g(x) = 3x^3 - 5x$

$$\begin{aligned} g(-x) &= 3(-x)^3 - 5(-x) = -3x^3 + 5x = -(3x^3 - 5x) \\ &= -g(x) \implies \text{ODD.} \end{aligned}$$

8. Use the graph of the function f , below, to find:



a. (5 pts) The intercepts (Express answers in ordered pairs.)

$x\text{-int} = (-5, 0), (-3, 0), (3, 0), (4.5, 0)$

$(0, 5)$ is $y\text{-int}$.

b. (5 pts) The domain and range.

$D = \mathbb{R}, R = [-2.5, \infty)$

c. The local extreme points (Give actual points on the graph.)

i. (2 pts) f has a local maximum at $(0, 5)$

ii. (2 pts) f has local minima at $(-4, -2), (3.5, -2.5)$

d. The intervals on which f is increasing, decreasing, or constant.

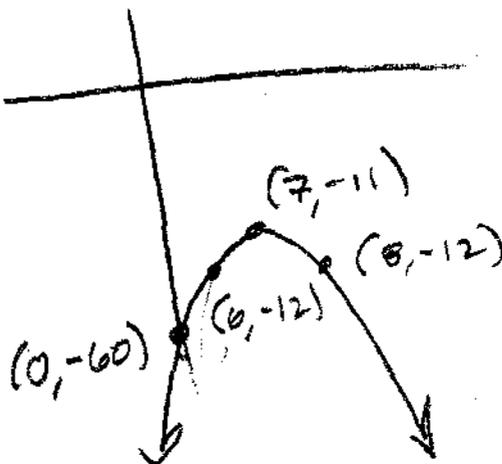
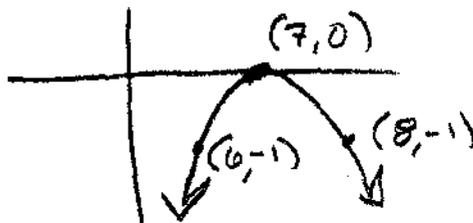
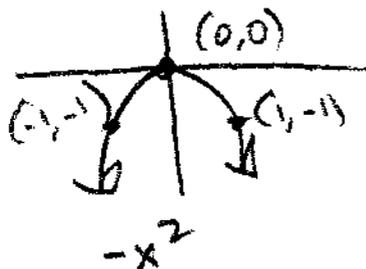
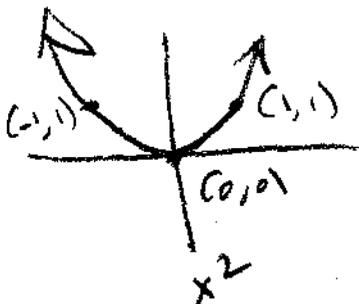
i. (2 pts) f is increasing on $(-4, 0) \cup (3.5, \infty)$

ii. (2 pts) f is decreasing on $(-\infty, -4) \cup (0, 3.5)$

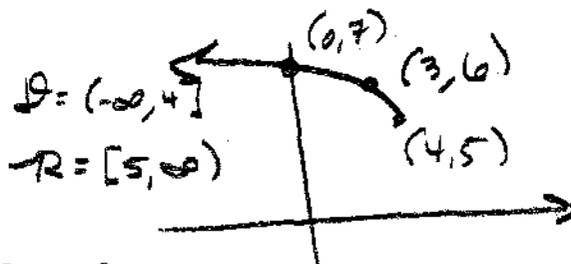
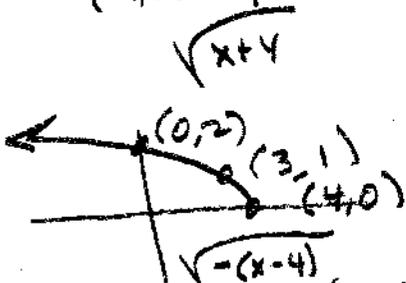
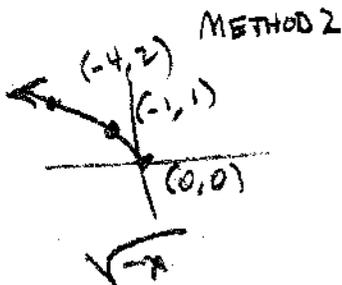
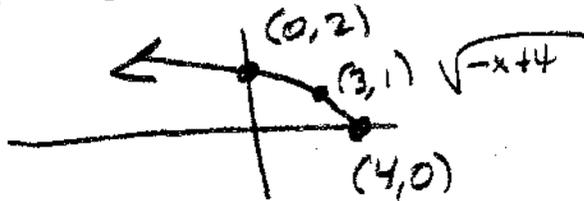
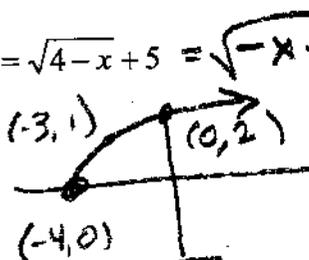
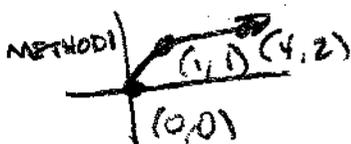
iii. (2 pts) f is constant on: Nowhere

9. Graph each of the following functions using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function and show all stages.

a. (6 pts) $g(x) = -(x-7)^2 - 11$

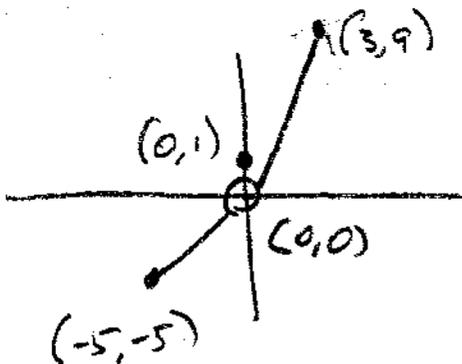


b. (7 pts) $g(x) = \sqrt{4-x} + 5 = \sqrt{-x+4} + 5$



$D = (-\infty, 4]$
 $R = [5, \infty)$

10. (8 pts) Sketch the graph of $f(x) = \begin{cases} x & \text{if } -5 \leq x < 0 \\ 1 & \text{if } x = 0 \\ 3x & \text{if } 0 < x \leq 3 \end{cases}$. Include all intercepts. State the domain and range.

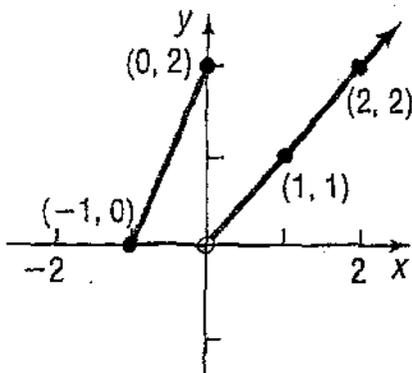


$D = [-5, 3]$

$R = [-5, 0) \cup (0, 3]$

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11. (6 pts) Determine the piecewise-defined function g from its graph, below.



$f(x) = \begin{cases} 2x+2 & \text{if } -1 \leq x \leq 0 \\ x & \text{if } 0 < x \leq 2 \end{cases}$