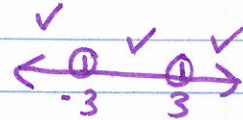


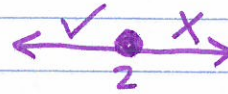
Unit 1: Review Key

1. $f(x) = \frac{x}{x^2-9}$ $x^2-9=0$
 No \emptyset $(x-3)(x+3)=0$
 $x=3$ $x=-3$



$$(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$$

2. $f(x) = \sqrt{2-x}$ $2-x=0$
 No neg. $x=2$



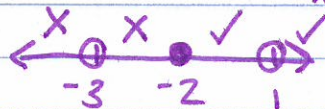
$$(-\infty, 2]$$

3. $f(x) = 4x+3$

$$\text{all } \mathbb{R}$$

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

4. $f(x) = \frac{\sqrt{x+2}}{x^2+2x-3}$ $x+2=0$ $x^2+2x-3=0$
 No neg. $x=-2$ $(x+3)(x-1)=0$
 $x=-3$ $x=1$



$$[-2, 1) \cup (1, \infty)$$

5. Shifting the graph right 2 units

6. y-axis

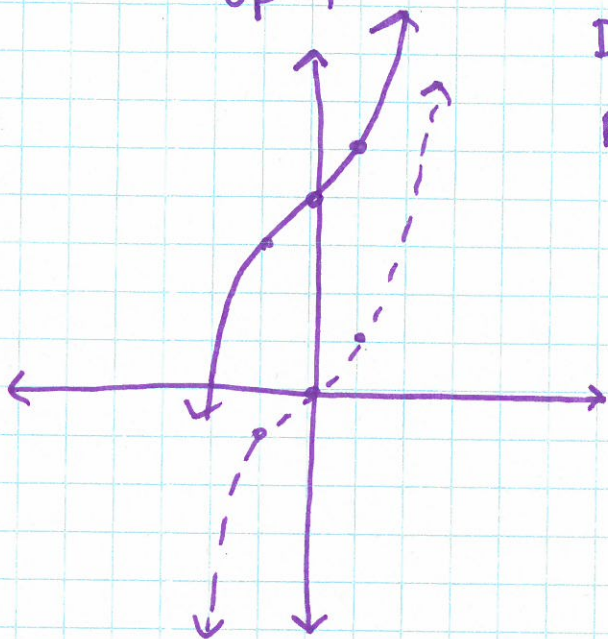
7. a) True
 b) False

8. a) $y = -\sqrt{x} + 2$

b) $y = -\sqrt{x+3} + 2$

c) $y = 3\sqrt{-x+4} - 2$ or $y = 3\sqrt{-(x-4)} - 2$

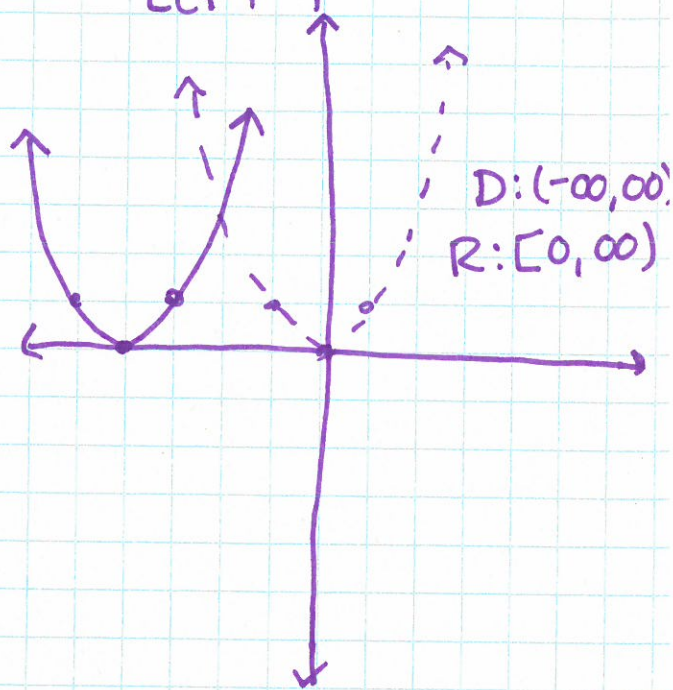
9. a) $f(x) = x^3 + 4$
up 4



$D: (-\infty, \infty)$

$R: (-\infty, \infty)$

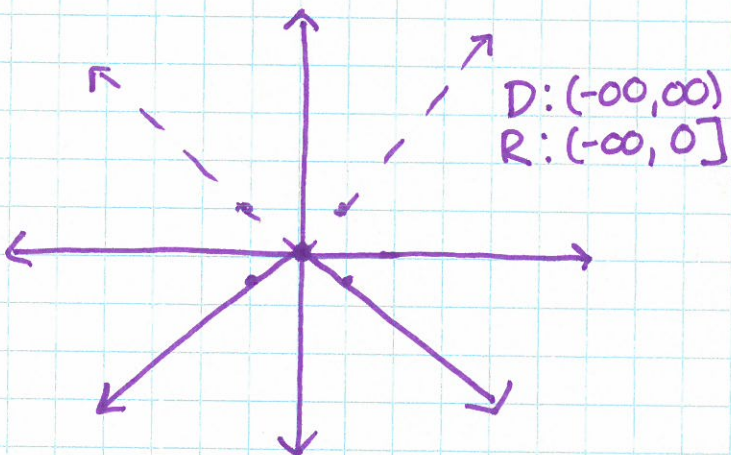
b) $f(x) = (x+4)^2$
left + 4



$D: (-\infty, \infty)$

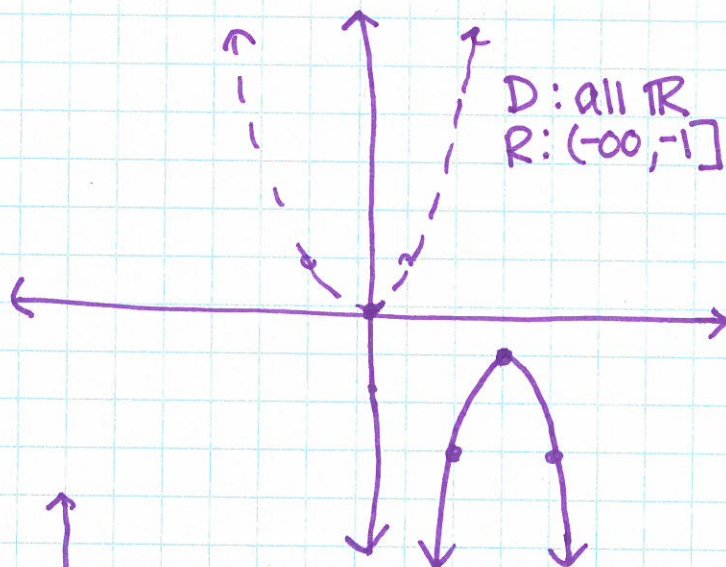
$R: [0, \infty)$

c) $f(x) = -\frac{1}{2}|x|$
Reflect x-axis
shrink vertically by 2



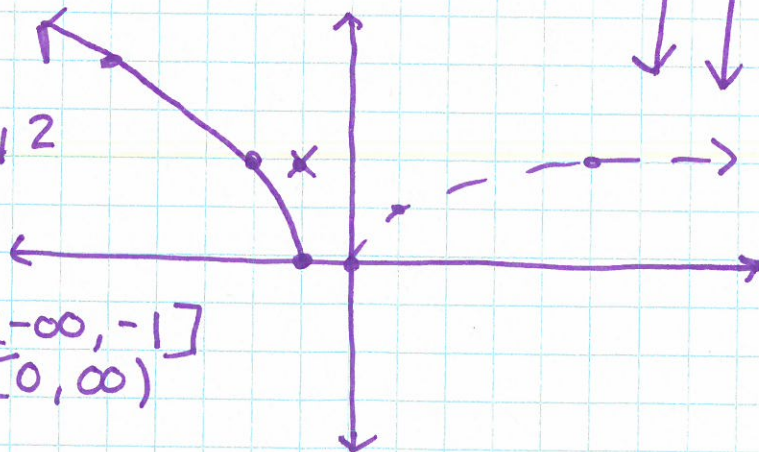
$D: (-\infty, \infty)$
 $R: (-\infty, 0]$

d) $f(x) = -2(x-3)^2 - 1$
Reflect x-axis
vertical stretch by 2
Right 3, Down 1



$D: \text{all } \mathbb{R}$
 $R: (-\infty, -1]$

e) $f(x) = 2\sqrt{-x-1}$
 $= 2\sqrt{-(x+1)}$
Stretch vertically by 2
Reflect y-axis
left + 1



$D: (-\infty, -1]$
 $R: [0, \infty)$

10. a) D: $(-2, \infty)$

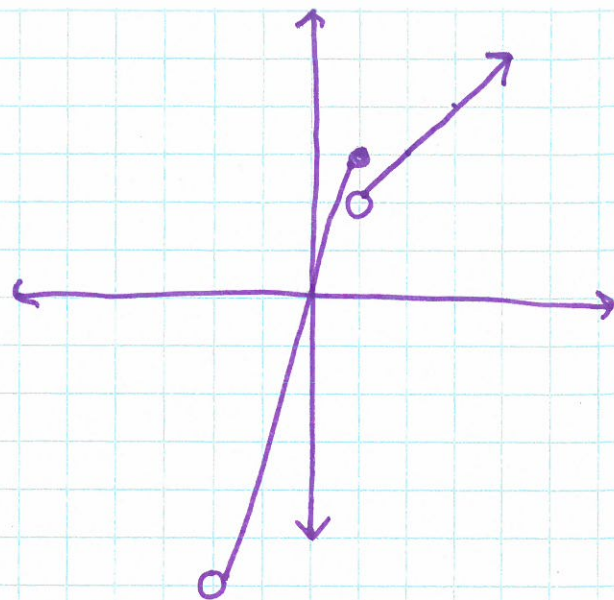
~~R: $(-2, \infty)$~~
R: $(-6, \infty)$

$$f(x) = \begin{cases} 3x, & -2 < x \leq 1 \\ x+1, & x > 1 \end{cases}$$

Inc: $(-2, \infty)$

Dec: Never

Constant: Never



b) D: $[-4, \infty)$

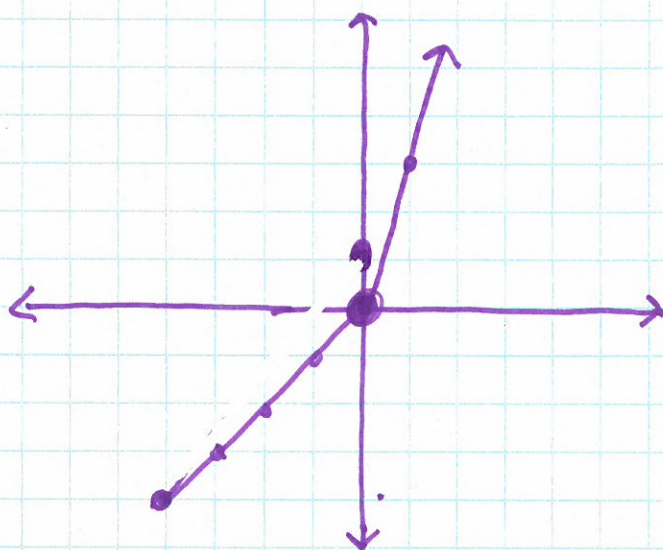
~~R: $[-4, \infty)$~~
R: $[-4, \infty)$

$$f(x) = \begin{cases} x, & -4 \leq x < 0 \\ 1, & x = 0 \\ 3x, & x > 0 \end{cases}$$

Inc: $(-4, \infty)$

Dec: Never

Constant: Never



c) D: $[-2, \infty)$

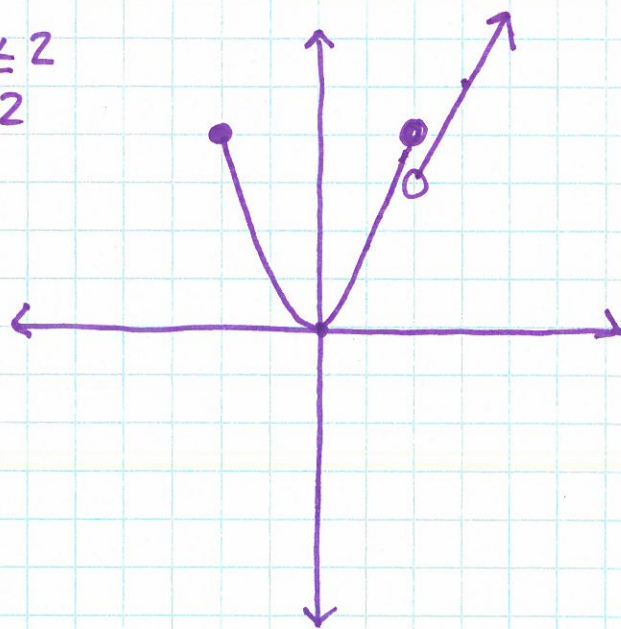
~~R: $[-2, \infty)$~~
R: $[0, \infty)$

$$f(x) = \begin{cases} x^2, & -2 \leq x \leq 2 \\ 2x-1, & x > 2 \end{cases}$$

Inc: $(0, \infty)$

Dec: $(-2, 0)$

Constant: Never



$$11. a) f(x) = 2x + 3$$

$$f(a+h) = 2(a+h) + 3$$

$$= 2a + 2h + 3$$

$$f(a) = 2a + 3$$

$$\frac{f(a+h) - f(a)}{h} = \frac{2a + 2h + 3 - \overbrace{(2a + 3)}}{h}$$

$$= \frac{2a + 2h + 3 - 2a - 3}{h}$$

$$= \frac{2h}{h} = \boxed{2}$$

$$b) f(x) = x^2 - 2$$

$$f(a+h) = (a+h)^2 - 2$$

$$= (a+h)(a+h) - 2$$

$$= a^2 + 2ah + h^2 - 2$$

$$f(a) = a^2 - 2$$

$$\frac{f(a+h) - f(a)}{h} = \frac{a^2 + 2ah + h^2 - 2 - (a^2 - 2)}{h}$$

$$= \frac{a^2 + 2ah + h^2 - \cancel{2} - a^2 + \cancel{2}}{h}$$

$$= \frac{2ah + h^2}{h}$$

$$= \boxed{2a + h}$$

$$12. f(-2) = (-2)^2 - 2(-2) = 0$$

$$f(1) = \cancel{1^2 - 2(1)} \quad 1^2 - 2(1) = -1$$

$$f(4) = 3(4) + 1 = 13$$

$$13. P(x) = \begin{cases} 0.33; & 0 < x \leq 1 \\ 0.33 + 0.22(x-1); & 1 < x \leq 12 \end{cases}$$

$$14. a. f(x) = \begin{cases} 120; & 0 < x \leq 10 \\ 120 + 12(x-10); & x > 10 \end{cases}$$

b. \$120 for 7 students
\$240 for 20 students

$$15. a. (-\infty, \infty) \quad b. [-2] \cup [0, \infty) \quad c. (0, \infty)$$

$$d. (-3, 0) \quad e. (-\infty, -3) \quad f. -2$$

$$g. 0 \quad h. 2 \quad i. 2$$