

Functions Practice

1. $f(x) = \frac{x-3}{\sqrt{x+5}}$

$$x+5=0$$

$$x = -5$$



$$D: (-5, \infty)$$

2. $f(x) = \sqrt{x^2+3}$

$$x^2+3=0$$

$$\sqrt{x^2} = \sqrt{-3}$$

$$x = i\sqrt{3}$$

*inside can never be less than

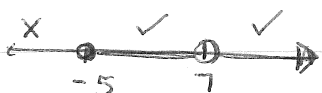
3 regardless of x value

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

3. $f(x) = \frac{\sqrt{x+5}}{x-7} \quad x \neq 7$

$$x+5=0$$

$$x = -5$$

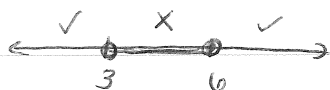


$$[-5, 7) \cup (7, \infty)$$

4. $x^2 - 7x + 5 \geq 2x - 13$

$$x^2 - 9x + 18 \geq 0$$

$$(x-6)(x-3) \geq 0$$



$$[3, 6]$$

5. $|3x+4| > 8$

$$3x+4 > 8 \quad \text{or} \quad 3x+4 < -8$$

$$3x > 4$$

$$3x < -12$$

$$x > \frac{4}{3}$$

$$x < -4$$



$$(-\infty, -4) \cup (\frac{4}{3}, \infty)$$

6. $\frac{10}{3x-2} < 2$

$$3x-2$$

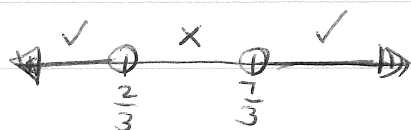
$$x \neq \frac{2}{3}$$

$$10 < 2(3x-2)$$

$$10 < 6x-4$$

$$14 < 6x$$

$$\frac{7}{3} < x$$



$$(\frac{7}{3}, \infty)$$

7. $-2x^3 + 5x - 7 \leq x^2 + 2x - 8$

$$0 \leq 2x^3 + x^2 - 3x - 1$$

$$[-1.341, -0.321] \cup [0.62, \infty)$$

8. $|-3x-5| > \sqrt{x+7}$

$$y_1 = |-3x-5|$$

$$y_2 = \sqrt{x+7}$$

2nd - calc - intersect

$$(-\infty, -2.383) \cup (-0.839, \infty)$$

9. $x^2 + 3x - 4 \leq -x^2 - 3x + 5$

$$2x^2 + 6x - 9 \leq 0$$

$$[-3.830, 1.098]$$

10. $f(x) = x^3 - 5x^2 + 3x + 6$
 increasing: $(-\infty, .333) \cup (3, \infty)$
 decreasing: $(.333, 3)$

11. $f(x) = \frac{3x+2}{x-5} \quad x \neq 5$
 increasing: none
 decreasing: $(-\infty, 5) \cup (5, \infty)$

12. $f(x) = -2x^2 - 5x + 6$
 increasing: $(-\infty, -1.25)$
 decreasing: $(-1.25, \infty)$

13. a) see graph paper
 b) $f(-7) = -4$ $f(2) = 2$
 $f(-4) = -2$ $f(4) = -1$
 $f(0) = 10$

c) increasing: $(-6, -4] \cup (-4, -1) \cup (2, \infty)$
 decreasing: $(-\infty, -6) \cup (-1, 2)$
 $f(x) = 3\sin(2x + \pi) - 4$ $\left[-\frac{\pi}{4}, \frac{3\pi}{2}\right]$ $g(x) = \frac{2}{3}x - 5$

14. $x = .152, 1.580, 2.975$

15. $[.152, 1.580] \cup [2.975, \frac{3\pi}{2}]$

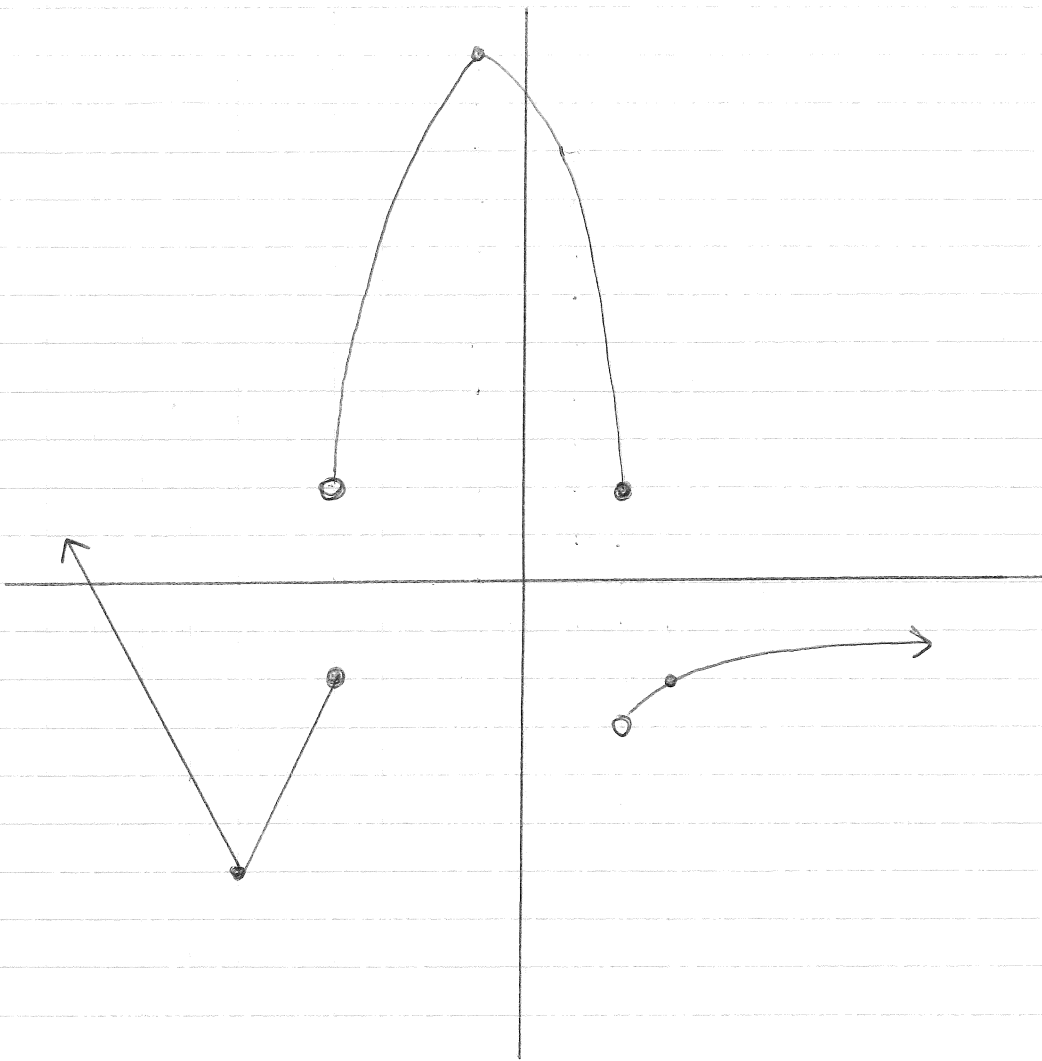
16. no solution

17. $[-\frac{\pi}{4}, .152] \cup [1.580, 2.975]$

18. no solution

19. $x = 7.5$

B.a)



Completing the square:

$$-x^2 - 2x + 10 = y$$

$$x^2 + 2x + 1 = 10 + 1 - y$$

$$x^2 + 2x + 1 = 11 - y$$

$$(x+1)^2 - 11 = -y$$

$$-(x+1)^2 + 11 = y$$

$$f(x) = \begin{cases} 2|x+6| + 6 & x \leq -4 & (-4, -2) \\ -x^2 - 2x + 10 & -4 < x \leq 2 & (-4, -2) \quad (2, 2) \\ -3 + \sqrt{x-2} & x > 2 & (2, -3) \end{cases}$$

$$20. \quad f(x) = \frac{2x^2 + 10x + 12}{x^2 - 2x - 15} = \frac{2(x^2 + 5x + 6)}{(x-5)(x+3)} = \frac{2(\cancel{x+3})(x+2)}{(x-5)\cancel{(x+3)}} = \frac{2(x+2)}{x-5}$$

$$D: x \neq 5, -3$$

$$\text{hole(s)}: (-3, \frac{1}{4})$$

$$HA: y = 2$$

$$VA: x = 5$$

$$SA: \text{none}$$

$$\begin{array}{c|c} x & y \\ \hline 6 & 16 \end{array}$$

$$21. \quad f(x) = \frac{x^2}{x^2 - x} = \frac{x^2}{x(x-1)} = \frac{x}{x-1}$$

$$D: x \neq 0, 1$$

$$\text{hole(s)}: (0, 0)$$

$$HA: y = 1$$

$$VA: x = 1$$

$$SA: \text{none}$$

$$\begin{array}{c|c} x & y \\ \hline 2 & 2 \end{array}$$

$$22. \quad f(x) = \frac{x^2 + x - 6}{x + 1} = \frac{(x+3)(x-2)}{x+1}$$

$$D: x \neq -1$$

$$\text{hole(s)}: \text{none}$$

$$HA: \text{none}$$

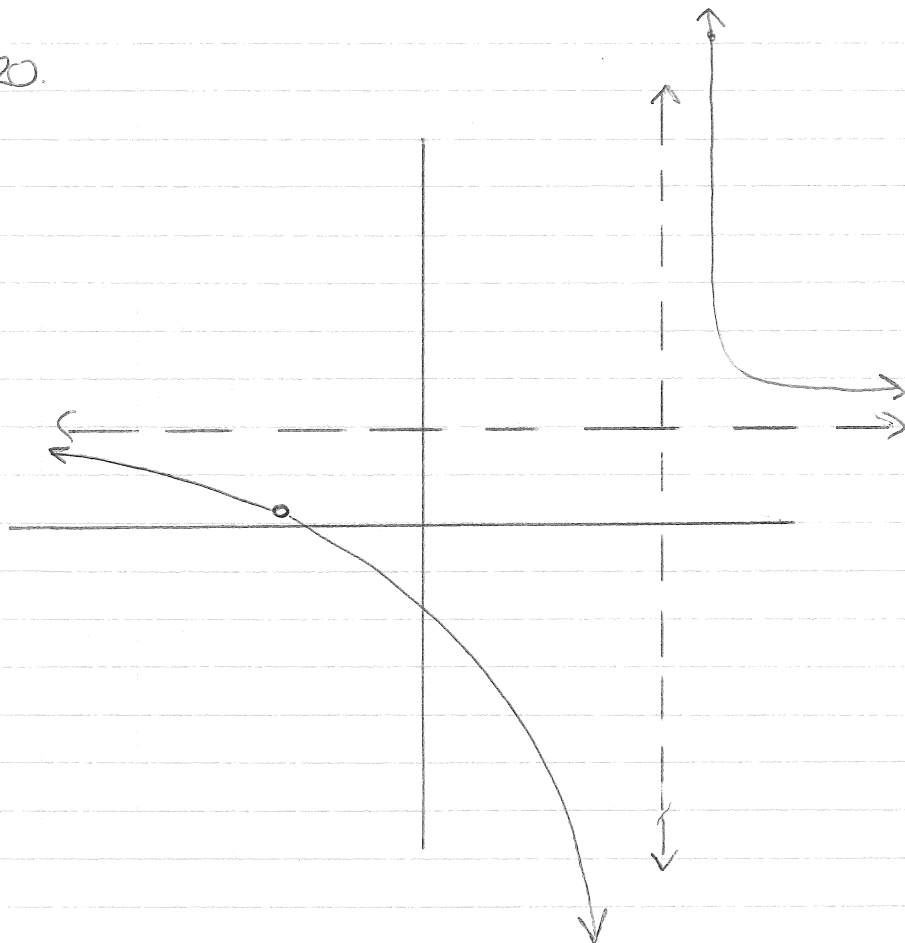
$$VA: x = -1$$

$$SA: y = x$$

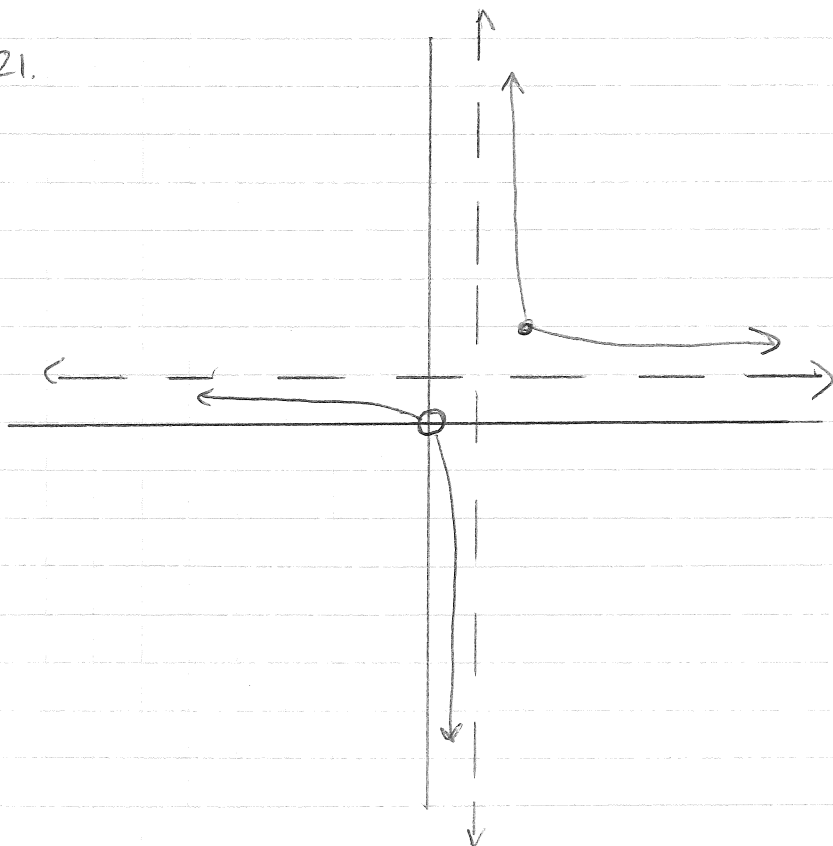
$$\begin{array}{r|rrr} -1 & 1 & -1 & -6 \\ & & 1 & 0 \\ \hline & 1 & 0 & -6 \end{array}$$

$$\begin{array}{c|c} x & y \\ \hline 0 & -6 \\ -2 & 4 \end{array}$$

20.



21.



22.

