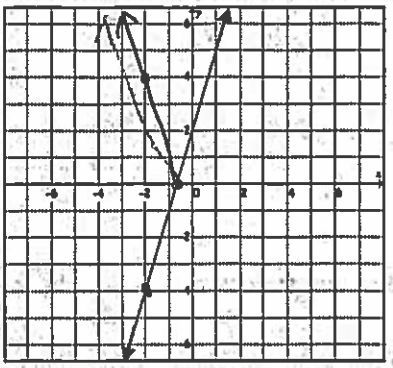
Mathematics 20-1 Name: Answers

Chapter 7: Absolute Value and Reciprocal Functions Date: _____

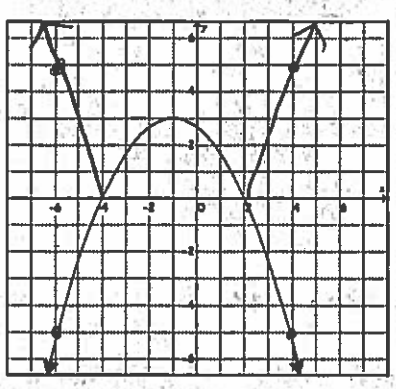
Final Exam Review Assignment

1. Given the graph of $y = f(x)$, sketch the graph of $y = |f(x)|$.

a)



b)



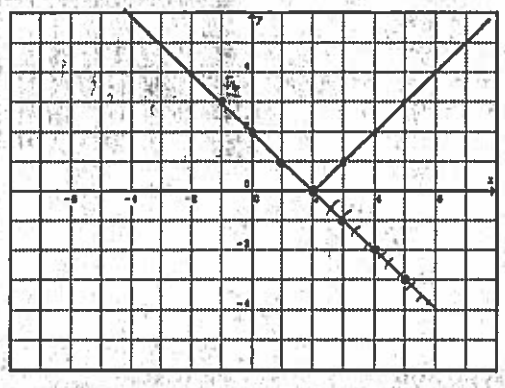
2. Consider the functions $y = |-x+2|$ and $y = |x^2 - x - 6|$.

a) Sketch the graph of $y = |-x+2|$ below.

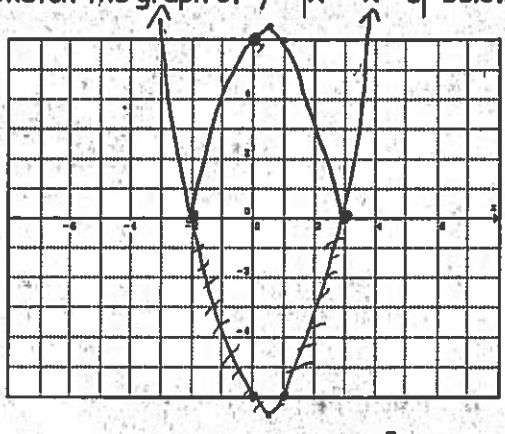
$-x+2 \geq 0$

$\frac{-x}{-1} \geq \frac{-2}{-1}$

$x \leq 2$



b) Sketch the graph of $y = |x^2 - x - 6|$ below.



$x = -\frac{b}{2a} = \frac{1}{2}$

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

$= -6.25$

y-int: $y = -($

c) Express each function above as a piecewise function.

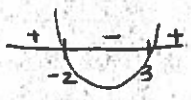
a) $y = \begin{cases} -x+2, & x \leq 2 \\ -(-x+2), & x > 2 \\ \text{OR } x-2 \end{cases}$

b) $y = \begin{cases} x^2-x-6, & x \leq -2 \text{ or } x \geq 3 \\ -(x^2-x-6), & -2 < x < 3 \end{cases}$

$x^2 - x - 6 = 0$

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

$x = -2 \quad x = 3$



$4x - 7 \geq 0$

$x \geq \frac{7}{4}$

3. Solve each of the following equations.

a) $|4x-7| = 6x+3$

$|4x-7| = \begin{cases} x \geq 7/4 \\ x < 7/4 \end{cases}$

Case 1

$4x-7 = 6x+3$

$4x-6x = 3+7$

$-2x = 10$

$x = -5$

$-5 \geq 7/4$ X

reject

Case 2

$4x-7 = -(6x+3)$

$4x+6x = -3+7$

$\frac{10x}{10} = \frac{4}{10}$

$x = \frac{4}{10}$ ✓

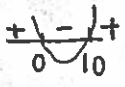
$x = \frac{2}{5} < \frac{7}{4}$

b) $|x^2 - 10x| = 24$

$x^2 - 10x = 0$

$x(x-10) = 0$

$x = 0 \quad x = 10$



Case 1: $x \leq 0, x \geq 10$

$x^2 - 10x = 24$

$x^2 - 10x - 24 = 0$

$(x-12)(x+2) = 0$

$x = 12 \quad x = -2$

$12 \geq 10$ ✓ $\quad -2 \leq 0$ ✓

Case 2: $0 < x < 10$

$-(x^2 - 10x) = 24$

$-x^2 + 10x = 24$

$x^2 - 10x + 24 = 0$

$(x-6)(x-4) = 0$

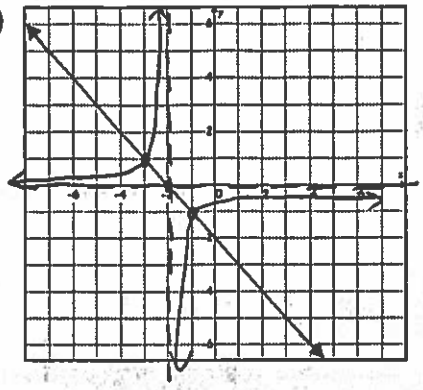
$x = 6 \quad x = 4$

$0 < 6 < 10$ ✓ $\quad 0 < 4 < 10$ ✓

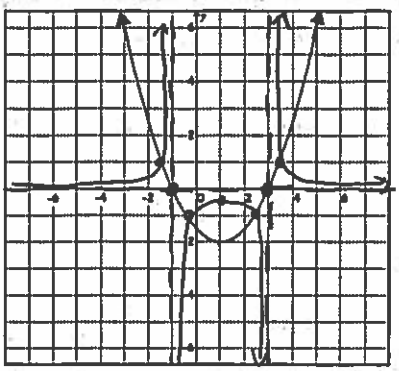
$x = -2, 4, 6, 12$

4. Given the graph of $y=f(x)$ below, sketch the graph of $y=\frac{1}{f(x)}$.

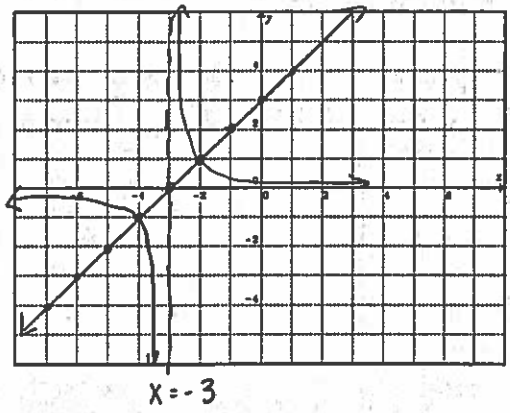
a)



b)



5. Graph the function $f(x)=x+3$ below then graph the reciprocal function $y=\frac{1}{f(x)}$ on the same set of axes. State the equation(s) of the vertical asymptote(s). How many invariant points are there?



2 invariant pts:

$x+3=1$ $\quad x+3=-1$

$x=-2$ $\quad x=-4$

vertical asy:

$x=-3$

6. Graph the function $f(x)=x^2+x-2$ below then graph the reciprocal function $y=\frac{1}{f(x)}$ on the same set of axes. State the equation(s) of the vertical asymptote(s). How many invariant points are there?

invariant pts:

$x^2+x-2=1$

$x^2+x-3=0$

$x=\frac{-1\pm\sqrt{1^2-4(1)(-3)}}{2(1)}$

$=\frac{-1\pm\sqrt{13}}{2}$

$x=1.3 \quad x=-2.3$

$(1.3,1) \quad (-2.3,1)$

$\frac{x^2+x-2}{+1}=\frac{-1}{+1}$

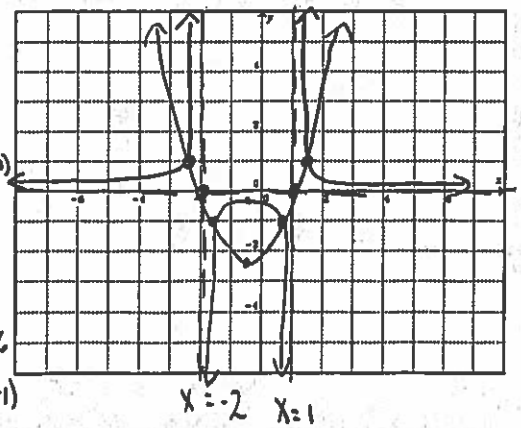
$x^2+x-1=0$

$x=\frac{-1\pm\sqrt{1-4(1)(-1)}}{2(1)}$

$=\frac{-1\pm\sqrt{5}}{2}$

$x=0.62 \quad x=-1.6$

$(0.62,-1) \quad (-1.6,-1)$



$x=-\frac{b}{2a}=-\frac{1}{2}=-0.5$

$y=(-0.5)^2+(-0.5)-2$

$=-2.25$

$x^2+x-2=0$

$(x+2)(x-1)=0$

$x=-2 \quad x=1$

vertical asy:

$x=-2 \quad x=1$