C11 - 7.0 - Q1 Absolute Value/Reciprocal Solutions

a) $|2-5|$

$= |-3|$

$= 3$

b) $|5| - |-7|$

$5 - 7$

$= -2$

c) $-|-8|$

$= -8$

2a) $|x| = 4$

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

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

$|4| = 4$ ✓

$|-4| = 4$ ✓

b) $|x-3| = 7$

$+(x-3) = 7$

$x - 3 = 7$

$x = 10$ ✓

$-(x-3) = 7$

$-x + 3 = 7$

$-x = 4$

$x = -4$ ✓

$|10-3| = 7$

$7 = 7$

$|-4-3| = 7$

$7 = 7$

c) $2|x-3| = 7$

$+2(x-3) = 7$

$2x - 6 = 7$

$2x = 13$

$x = \frac{13}{2}$ ✓

$-2(x-3) = 7$

$-2x + 6 = 7$

$-2x = 1$

$x = -\frac{1}{2}$ ✓

$2\left|\frac{13}{2} - \frac{3}{1}\right| = 7$

$2\left|\frac{13}{2} - \frac{6}{2}\right| = 7$

$2\left|\frac{7}{2}\right| = 7$

$2\left|-\frac{1}{2} - \frac{3}{1}\right| = 7$

$2\left|-\frac{1}{2} - \frac{6}{2}\right| = 7$

$2\left|-\frac{7}{2}\right| = 7$

d) $|x+5| = -9$

absolute value can't equal a negative

= No solution

e) $|x^2-1| = 3$

$+(x^2-1) = 3$

$x^2-1 = 3$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$ ✓

$-(x^2-1) = 3$

$-x^2+1 = 3$

$-x^2 = 2$

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

no solution

$|2^2-1| = 3$

$|(-2)^2-1| = 3$

f) $|-x^2+1| = x+1$

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

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

$x^2+x = 0$

$x(x+1) = 0$

✓ $x=0$ $x=-1$ ✓

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

$x^2-1 = x+1$

$x^2-x-2 = 0$

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

✓ $x=2$ $x=-1$

$|-(0)^2+1| = 0+1$

$|1| = 1$

$|-(2)^2+1| = 2+1$

$|-3| = 3$

$|-(-1)^2+1| = -1+1$

$|0| = 0$

g) $|x^2-2x-3|=5$

$+(x^2-2x-3)=5$

$x^2-2x-8=0$

$(x-4)(x+2)$

$x=4$ ✓ $x=-2$ ✓

$|4^2-2(4)-3|=5$

$|16-8-3|=5$

$|5|=5$

$|(-2)^2-2(-2)-3|=5$

$|4+4-3|=5$

$|5|=5$

$-(x^2-2x-3)=5$

$-x^2+2x+3=5$

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

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

$$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

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

$$\frac{2\pm\sqrt{-4}}{2}$$

no solution

h) $|x+2| = 4$

$+(x+2) = 4$

$x+2 = 4$

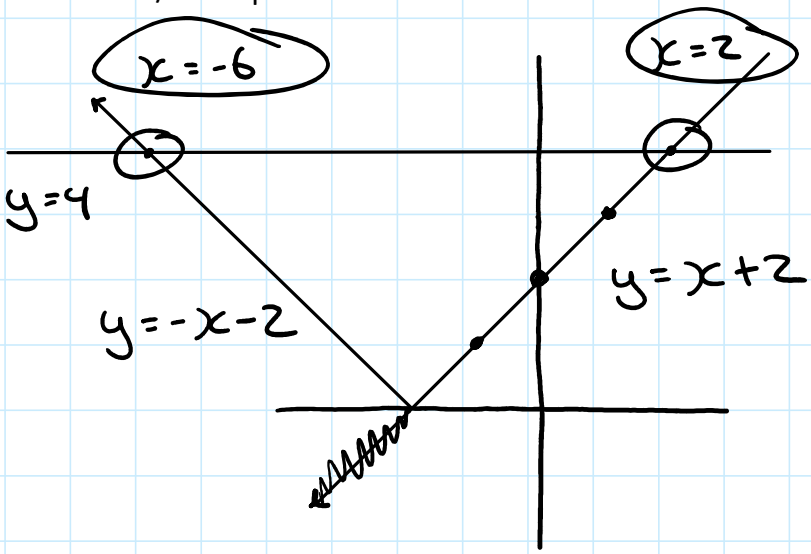
$x = 2$ ✓

$-(x+2) = 4$

$-x-2 = 4$

$-x = 6$

$x = -6$ ✓



i) $|x^2-2x| = 3$

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

$x^2-2x-3 = 0$

$(x-3)(x+1) = 0$

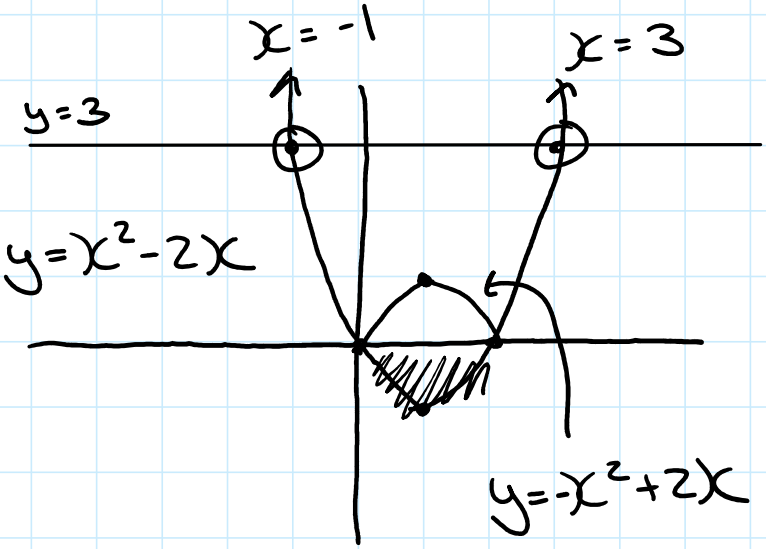
$x = 3$ $x = -1$ ✓ ✓

$-(x^2-2x) = 3$

$-x^2+2x = 3$

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

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



$b^2 - 4ac$

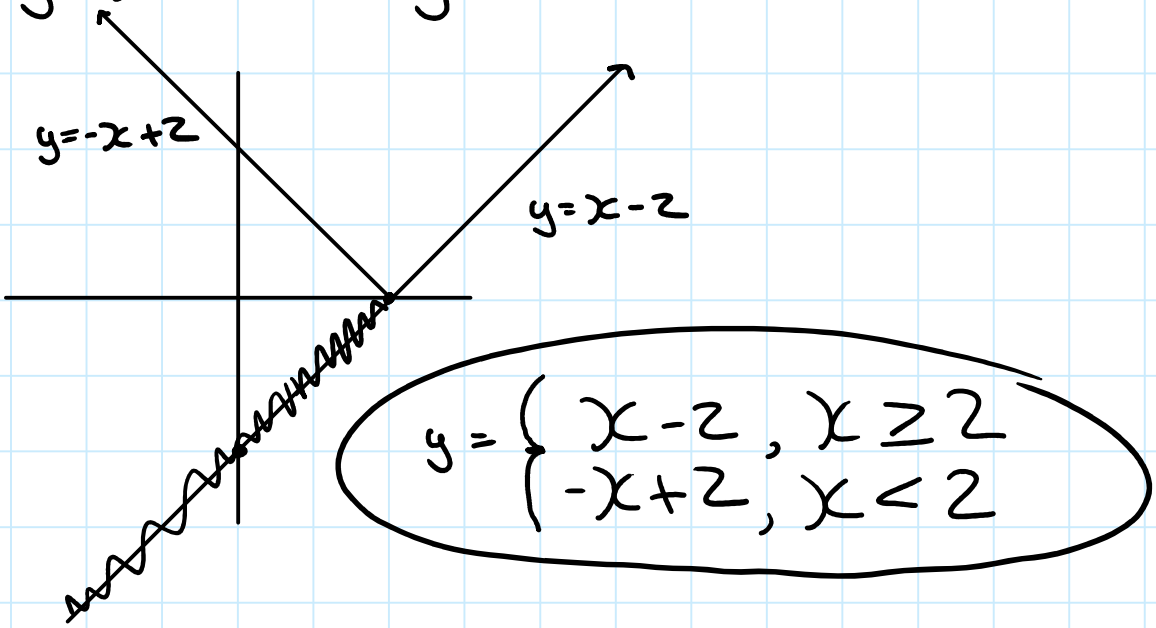
$(-2)^2 - 4(1)(3) = -8$

no solution

3a) $y = |x-2|$

$y = +(x-2)$ $\quad$ $y = -(x-2)$

$y = x-2$ $\quad$ $y = -x+2$

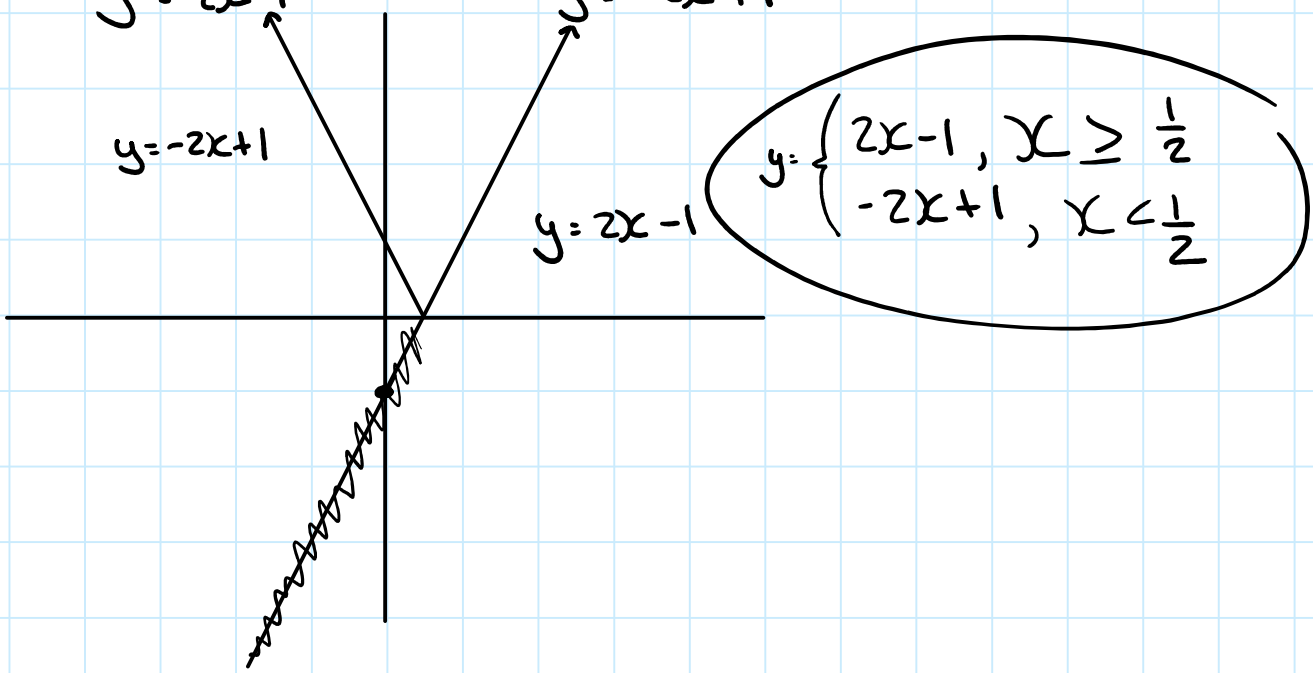


$$y = \begin{cases} x-2, & x \geq 2 \\ -x+2, & x < 2 \end{cases}$$

b) $y = |2x-1|$

$y = +(2x-1)$ $\quad$ $y = -(2x-1)$

$y = 2x-1$ $\quad$ $y = -2x+1$

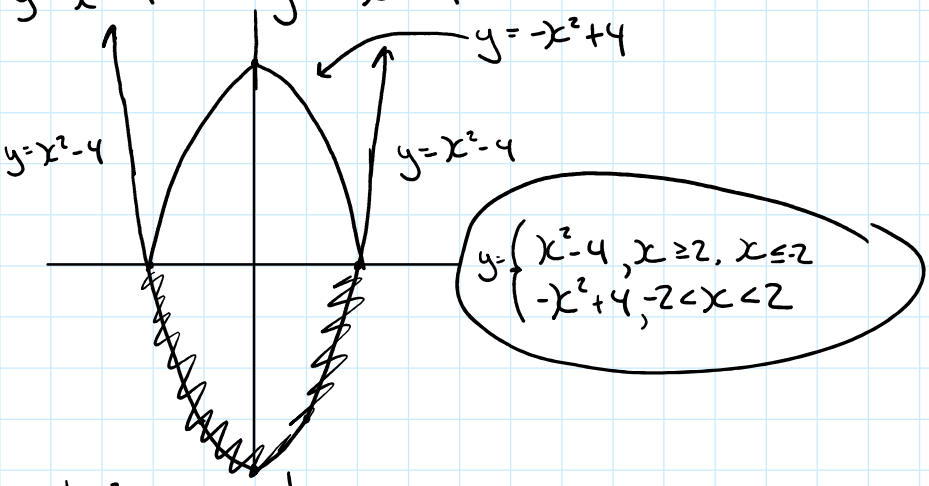


$$y = \begin{cases} 2x-1, & x \geq \frac{1}{2} \\ -2x+1, & x < \frac{1}{2} \end{cases}$$

3c) $y = |x^2 - 4|$

$y = +(x^2 - 4)$ $\quad$ $y = -(x^2 - 4)$

$y = x^2 - 4$ $\quad$ $y = -x^2 + 4$



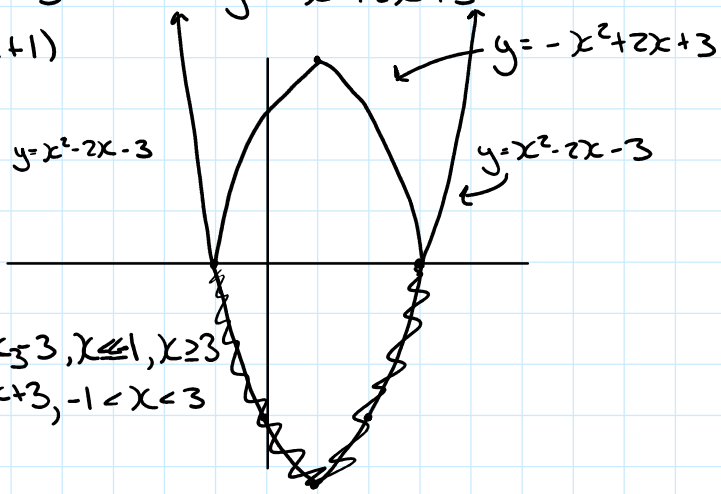
$y = \begin{cases} x^2 - 4, & x \geq 2, \ x \leq -2 \\ -x^2 + 4, & -2 < x < 2 \end{cases}$

d) $y = |x^2 - 2x - 3|$

$y = +(x^2 - 2x - 3)$ $\quad$ $y = -(x^2 - 2x - 3)$

$y = x^2 - 2x - 3$ $\quad$ $y = -x^2 + 2x + 3$

$(x - 3)(x + 1)$



$y = \begin{cases} x^2 - 2x - 3, & x \leq -1, \ x \geq 3 \\ -x^2 + 2x + 3, & -1 < x < 3 \end{cases}$

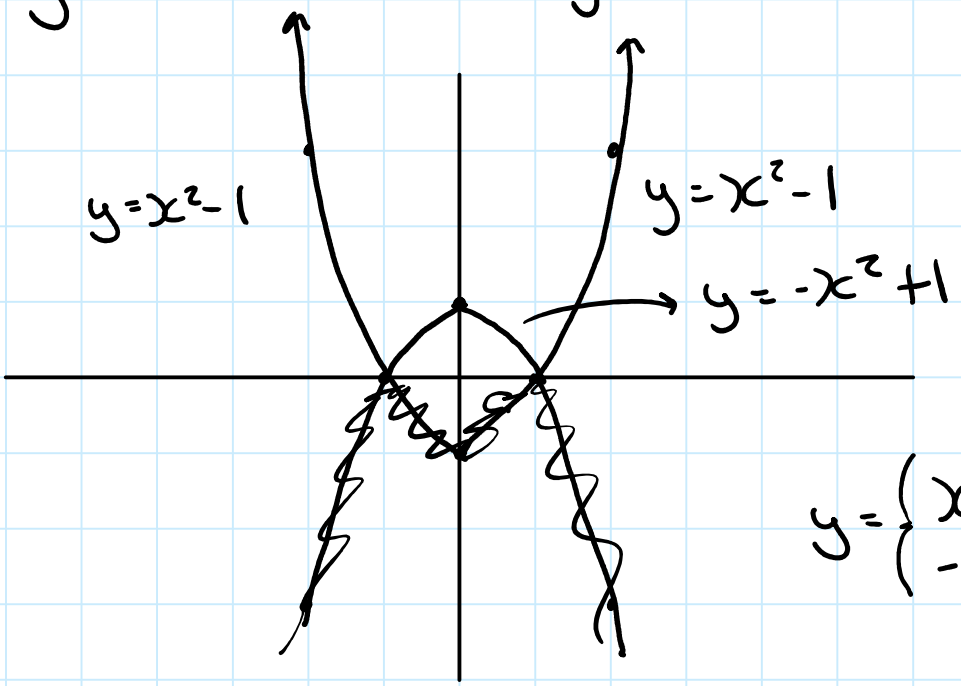
e) $y = |-x^2+1|$

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

$y = -x^2+1$

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

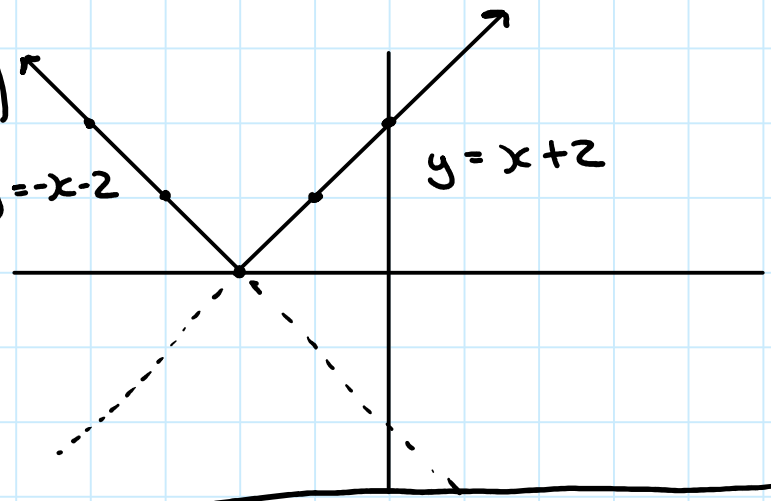
$y = x^2-1$



$$y = \begin{cases} x^2-1, & x \geq 1, x \leq -1 \\ -x^2+1, & -1 < x < 1 \end{cases}$$

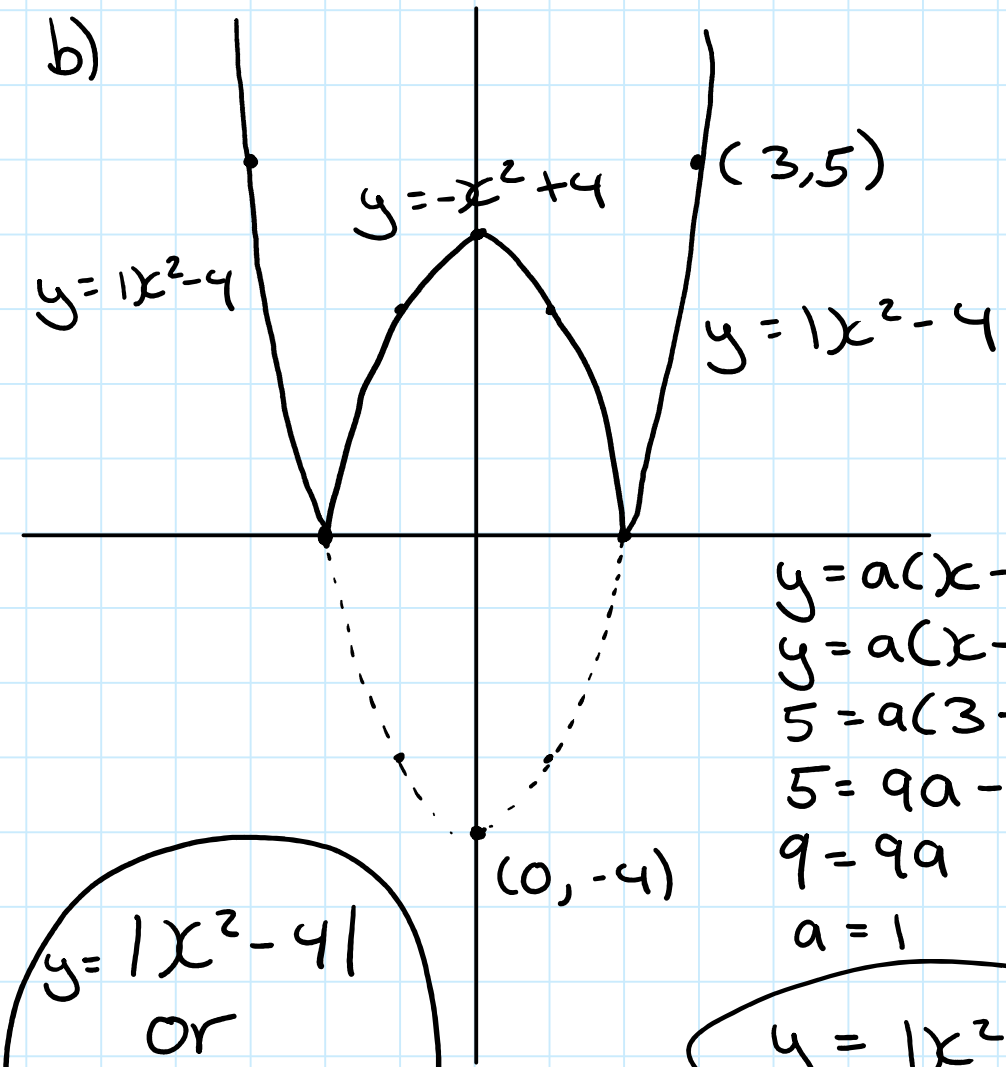
C11 - 7.0 - Q4 Absolute Value/Reciprocal Solutions

4a)



$y = |x+2|$ or $y = |-x-2|$

b)



$y = a(x-p)^2 + q$

$y = a(x-0)^2 - 4$

$5 = a(3-0)^2 - 4$

$5 = 9a - 4$

$9 = 9a$

$a = 1$

$y = |x^2 - 4|$

$y = |x^2 - 4|$ or $y = |-x^2 + 4|$

5a) $\frac{1}{x-2}$

$x-2 \neq 0$

$x \neq 2$

b) $\frac{1}{x^2+5x-6}$

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

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

$x \neq -6$ $x \neq 1$

c) $\frac{1}{x^2+1}$

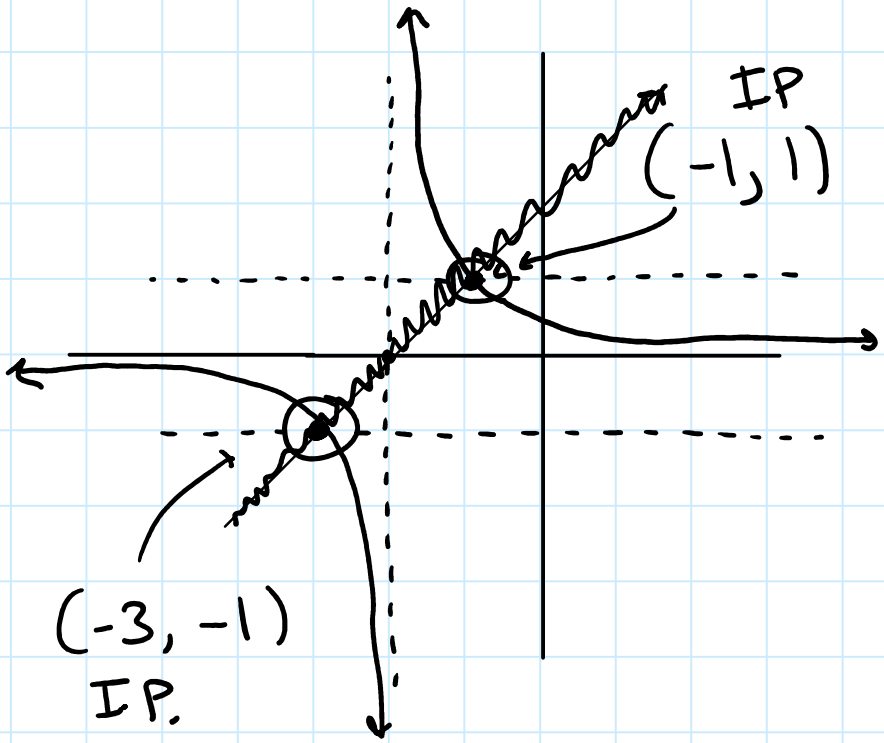
$x^2+1 \neq 0$

$x^2 \neq -1$

no restrictions

6a) $y = x + 2$

$y = \frac{1}{x+2}$

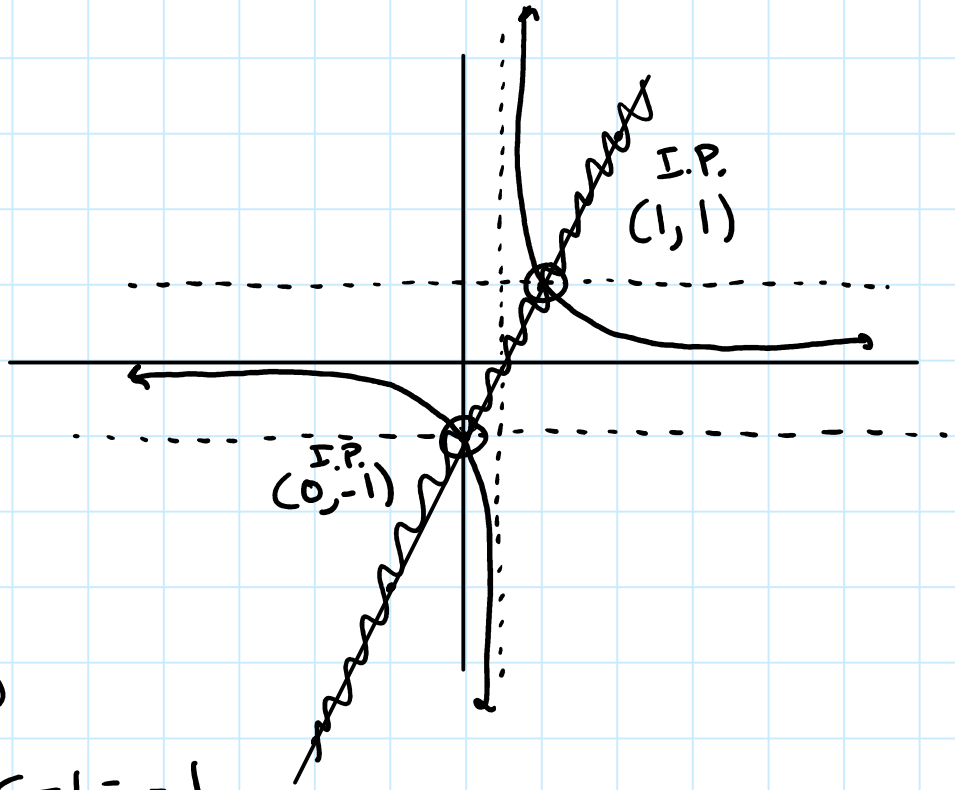


Va: $x + 2 = 0$

$x = -2$

b) $y = 2x - 1$

$y = \frac{1}{2x-1}$



Va: $2x - 1 = 0$

$2x = 1$

$x = \frac{1}{2}$

IP $2x - 1 = 1$

$2x = 2$

$x = 1$

$2x - 1 = -1$

$2x = 0$

$x = 0$

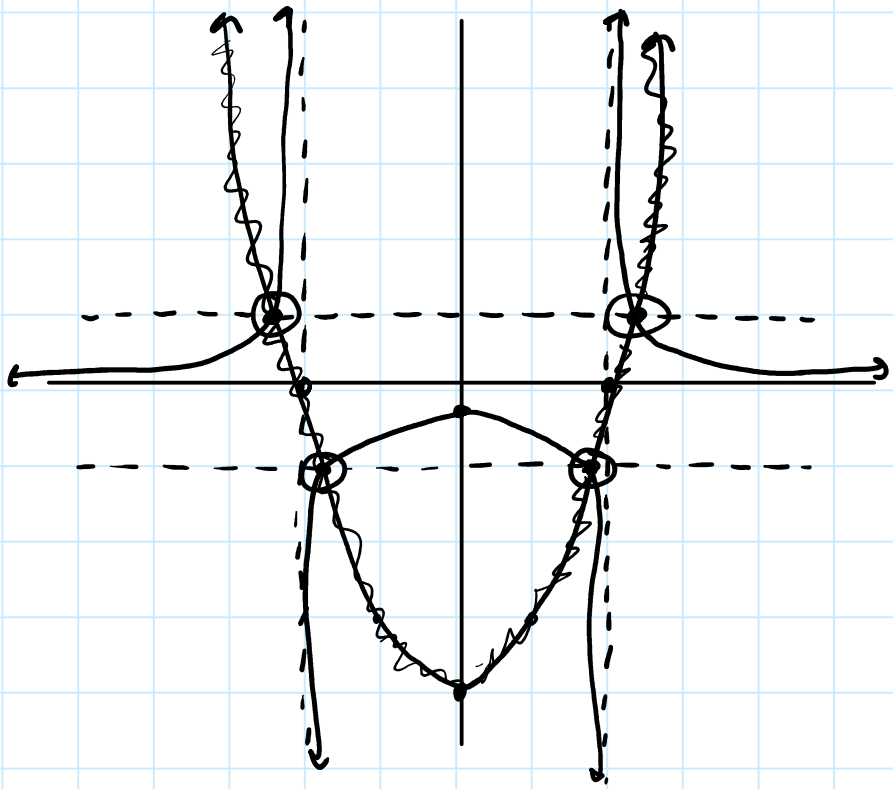
c) $y = x^2 - 4$

$y = \frac{1}{x^2 - 4}$

Va: $x^2 - 4 = 0$

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

$x = -2 \quad x = 2$



IP $x^2 - 4 = 1$

$x^2 = 5$

$x = \pm\sqrt{5}$

$x^2 - 4 = -1$

$x^2 = 3$

$x = \pm\sqrt{3}$

d) $y = |x^2 - 2x - 3|$

$y = \dfrac{1}{x^2 - 2x - 3}$

I.P. $x^2 - 2x - 3 = 1$

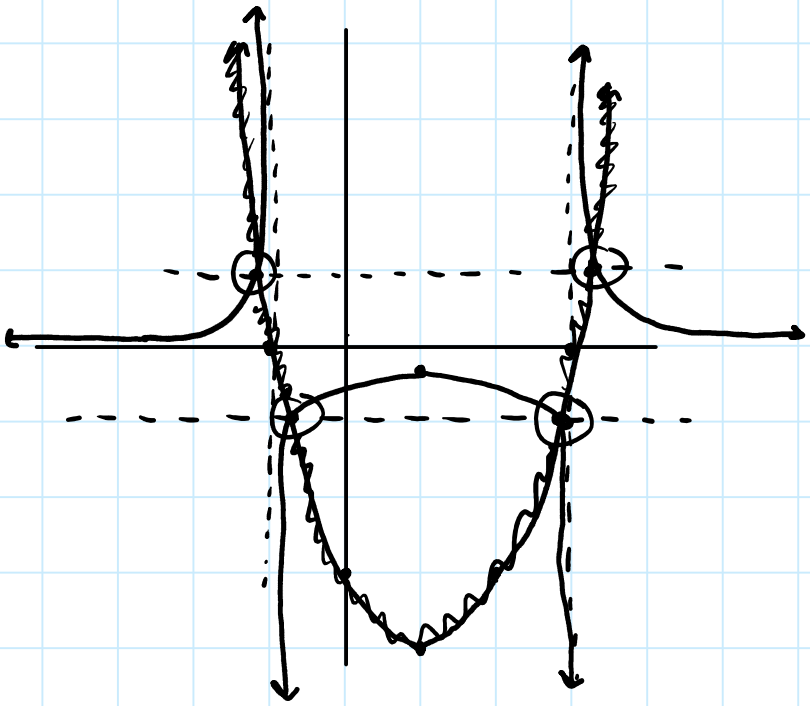
$x^2 - 2x - 4 = 0$

quad form...

VA: $x^2 - 2x - 3 = 0$

$(x - 3)(x + 1) = 0$

$x = 3 \quad x = -1$



e) $y = x^2 + 1$

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

Va: $x^2 + 1 = 0$

$\sqrt{x^2} = \sqrt{-1}$

no Va

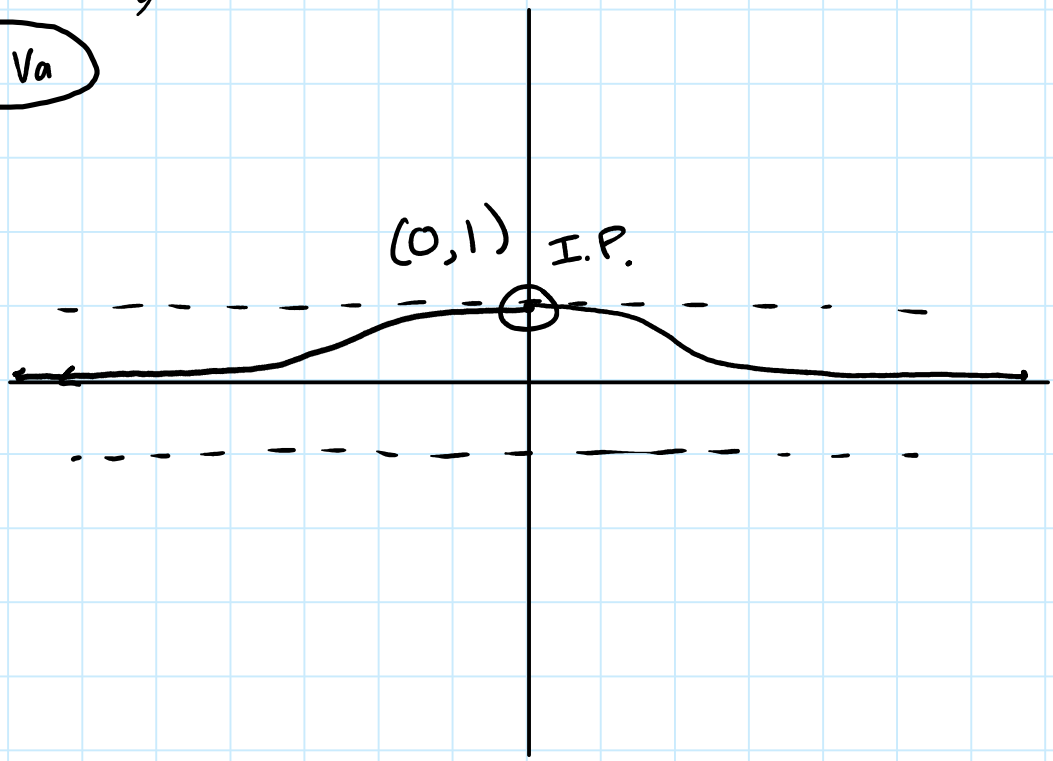
IP $x^2 + 1 = 1$ $x^2 + 1 = -1$

$x^2 = 0$ $\sqrt{x^2} = \sqrt{-2}$

$x = 0$

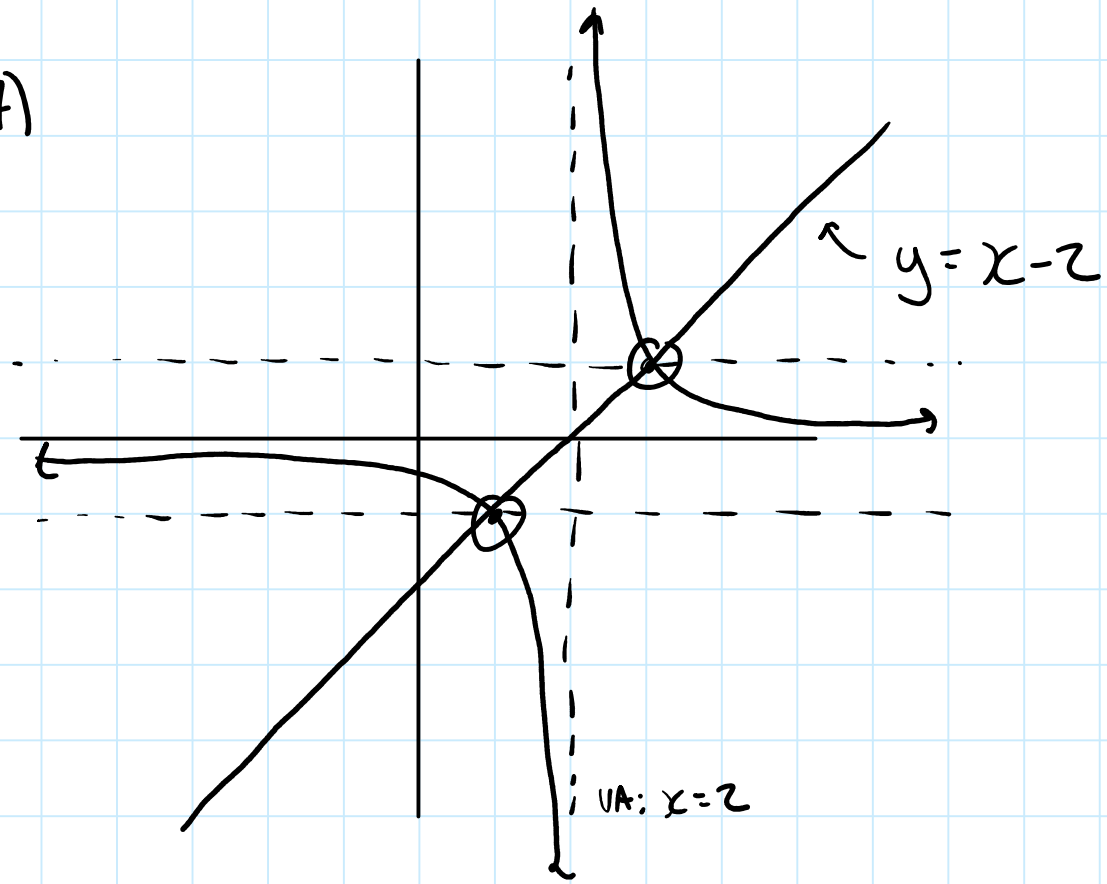
$y = (0)^2 + 1$

$y = 1$



C11 - 7.0 - Q7 Absolute Value/Reciprocal Solutions

7)



$$y = \frac{1}{x-2}$$