

1.)  $y = x^2 + 6x - 7$

$$x = -\frac{b}{2a} = \frac{-6}{2} = -3$$

$$y = (-3)^2 + 6(-3) - 7$$

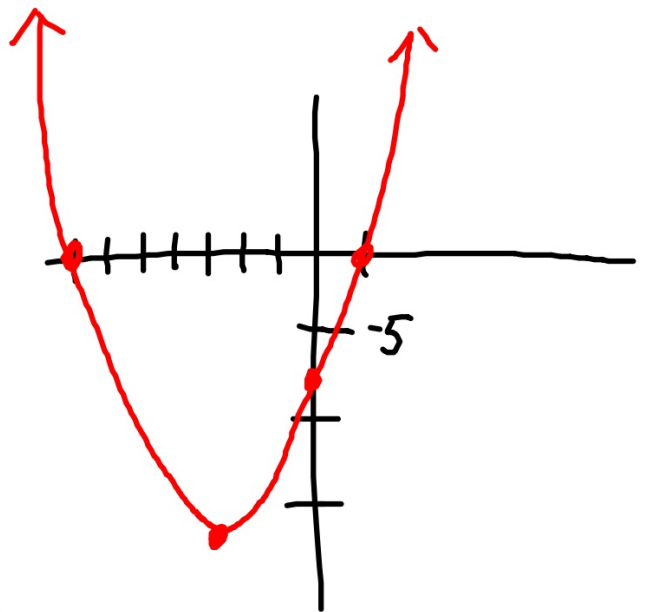
$$y = 9 - 18 - 7 = -16$$

$$V: (-3, -16)$$

$$x^2 + 6x - 7 = 0 \quad y\text{-int: } (0, -7)$$

$$(x+7)(x-1) = 0$$

$$x = -7, 1$$



$$2.) x^2 - 3x - 7$$

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

$$x = \frac{3 \pm \sqrt{9 - 4 \cdot 1 \cdot -7}}{2}$$

$$x = \frac{3 \pm \sqrt{37}}{2}$$

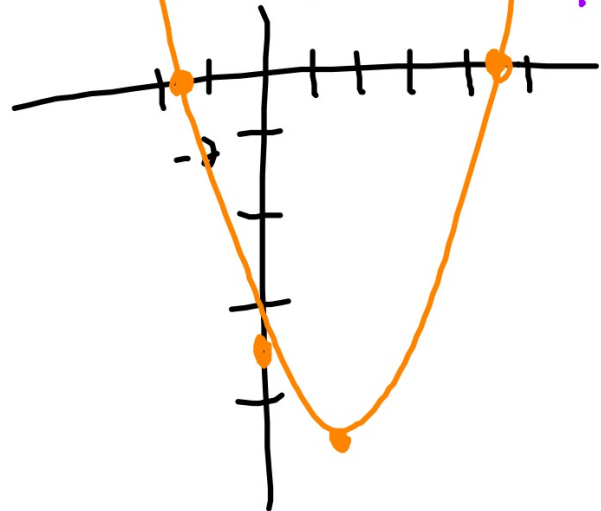
$$\text{int.: } (0, -7)$$

$$x = \frac{-b}{2a} = \frac{3}{2}$$

$$y = \left(\frac{3}{2}\right)^2 - 3\left(\frac{3}{2}\right) - 7$$

$$y = \left(\frac{3}{2}\right)^2 - 3\left(\frac{3}{2}\right) - 7$$

$$\frac{9}{4} - \frac{9}{2} - 7 = \frac{9}{4} - \frac{18}{4} - \frac{28}{4} = \frac{9 - 18 - 28}{4} = \frac{-37}{4}$$



3.) Write in vertex form: vertex  $(1, -4)$  point  $(2, -3)$

$$y = a(x-h)^2 + k$$

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

$$-3 = a - 4$$

$$1 = a$$

$$y = 1(x-1)^2 - 4$$

$$4.) x^3 + 2x^2 - 25x - 50 = 0$$

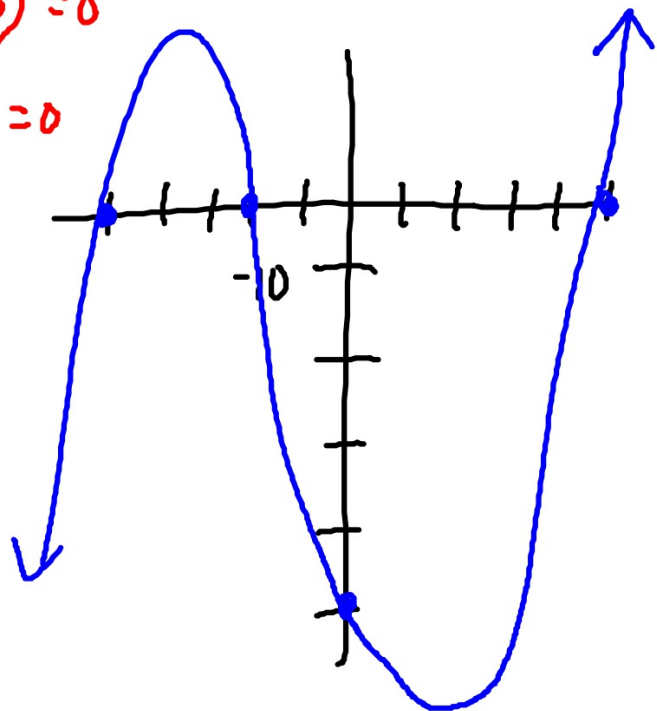
$$(x^3 + 2x^2) + (-25x - 50) = 0$$

$$x^2(x+2) - 25(x+2) = 0$$

$$(x+2)(x^2 - 25) = 0$$

$$x = -2, \pm 5$$

$$y\text{-int} : (0, -50)$$



$$5.) -\underline{x^5} - 7x^3 - 10x = 0$$

$$-x(x^4 + 7x^2 + 10) = 0$$

$$-x(x^2 + 5)(x^2 + 2) = 0$$

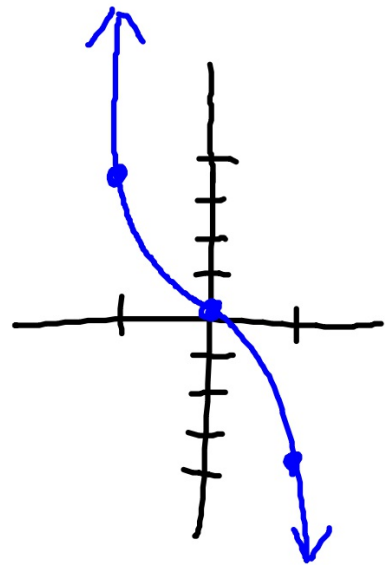
$$-x = 0 \quad | \quad x^2 + 5 = 0 \quad | \quad x^2 + 2 = 0$$

$$\boxed{x = 0} \quad | \quad \boxed{x = \pm i\sqrt{5}} \quad | \quad \boxed{x = \pm i\sqrt{2}}$$

y-int: (0, 0)

$$f(1) = -18$$

$$f(-1) = 18$$



6.)  $x^4 + 3x^2 + 2 = 0$

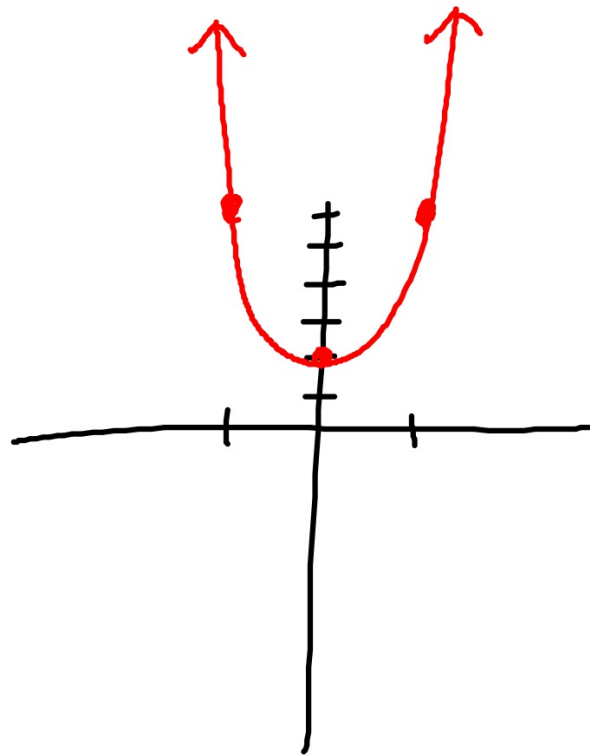
$$(x^2 + 2)(x^2 + 1) = 0$$

$$x = \pm i\sqrt{2}, \pm i$$

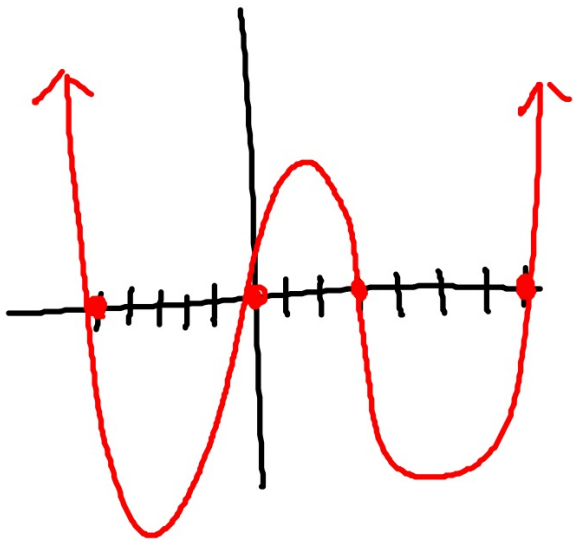
$$y\text{-int: } (0, 2)$$

$$f(1) = 6$$

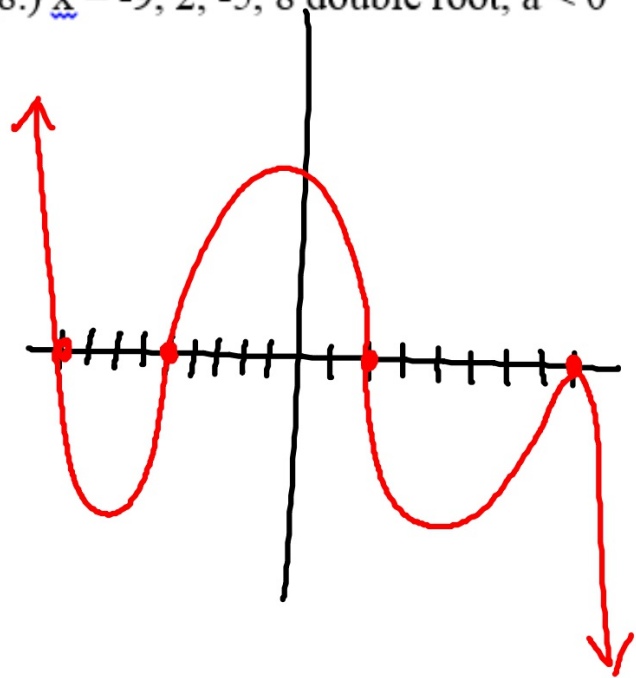
$$f(-1) = 6$$



7.)  $x = -5, 3, 0, 7, a > 0$



8.)  $x = -9, 2, -5, 8$  double root,  $a < 0$



9.)  $(3x^3 + 20x^2 + 29x - 12)/(x + 3)$

$$\begin{array}{r|rrrr} -3 & 3 & 20 & 29 & -12 \\ & & -9 & -33 & 12 \\ \hline & 3 & 11 & -4 & 0 \end{array}$$

$$3x^2 + 11x - 4$$

Yes

10.)  $(6x^3 - 2x - 5)/(x - 4)$

$$\begin{array}{r|rrrr} 4 & 6 & 0 & -2 & -5 \\ & & 24 & 96 & 376 \\ \hline & 6 & 24 & 94 & 371 \end{array}$$

$$6x^2 + 24x + 94 + \frac{371}{x-4}$$

No

$$11.) x^3 - 2x^2 - 21x - 18$$

$$\frac{p}{q}: \pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18$$

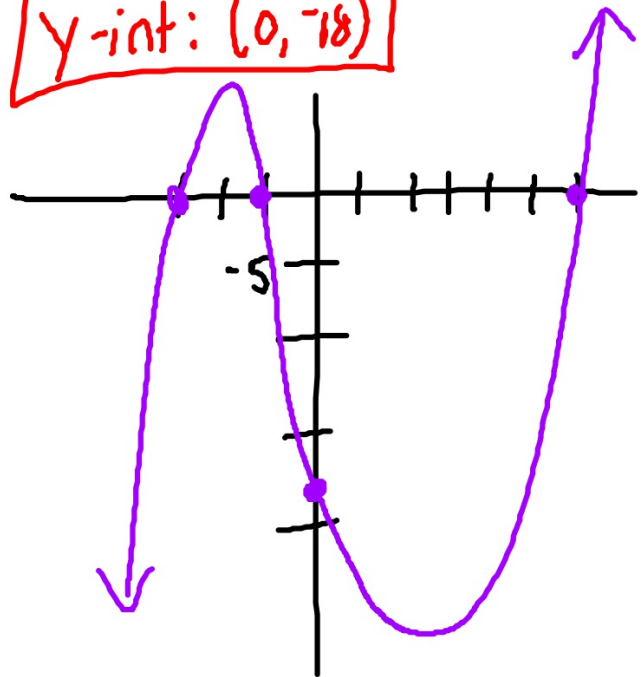
$$\begin{array}{r|rrrr} -1 & 1 & -2 & -21 & -18 \\ & & -1 & 3 & 18 \\ \hline & 1 & -3 & -18 & 0 \end{array}$$

$$x^2 - 3x - 18 = 0$$

$$(x-6)(x+3) = 0$$

$$x = 6, -3, -1$$

$$y\text{-int: } (0, -18)$$



12.)  $25x^4 + 25x^3 - 154x^2 - 4x + 24$

$\frac{p}{q}: \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{3}{5}, \pm \frac{4}{5}, \pm \frac{6}{5},$   
 $\pm \frac{8}{5}, \pm \frac{12}{5}, \pm \frac{24}{5}, \pm \frac{1}{25}, \pm \frac{2}{25}, \pm \frac{3}{25}, \pm \frac{4}{25}, \pm \frac{6}{25}, \pm \frac{8}{25}, \pm \frac{12}{25}, \pm \frac{24}{25}$

2) 
$$\begin{array}{r} 25 \ 25 \ -154 \ -4 \ 24 \\ 50 \ 150 \ -8 \ -24 \\ \hline 25 \ 75 \ -4 \ -12 \ 0 \end{array}$$

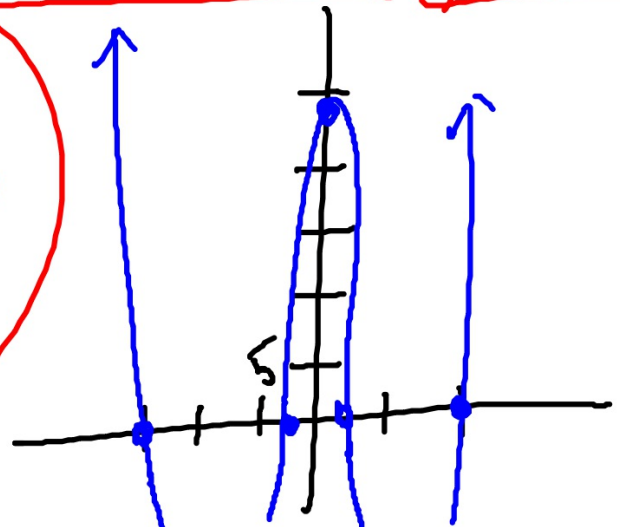
$(25x^3 + 75x^2) + (-4x - 12) = 0$

$25x^2(x+3) - 4(x+3) = 0$

$(x+3)(25x^2 - 4) = 0$

$x = 2, -3, \pm \frac{2}{5}$

y-int:  $(0, 24)$



$$13.) f(x) = \frac{x-2}{x^2-4} = \frac{\cancel{x-2}}{(\cancel{x-2})(x+2)} = -\frac{1}{x+2}$$

hole:  $(2, \frac{1}{4})$

VA:  $x = -2$

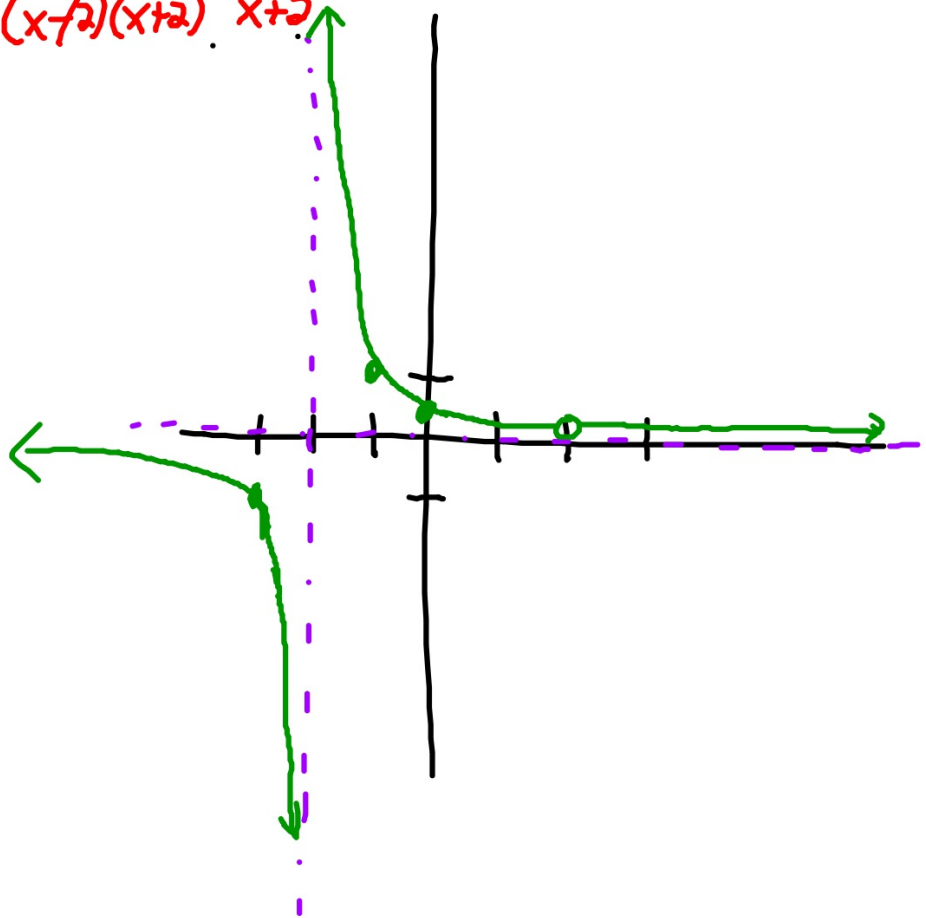
HA:  $y = 0$

SA: none

y-int:  $(0, -\frac{1}{2})$

$$f(-1) = 1$$

$$f(-3) = -1$$



14.)  $f(x) = \frac{5x-7}{3x+1}$

Hde: none

VA:  $x = -1/3$

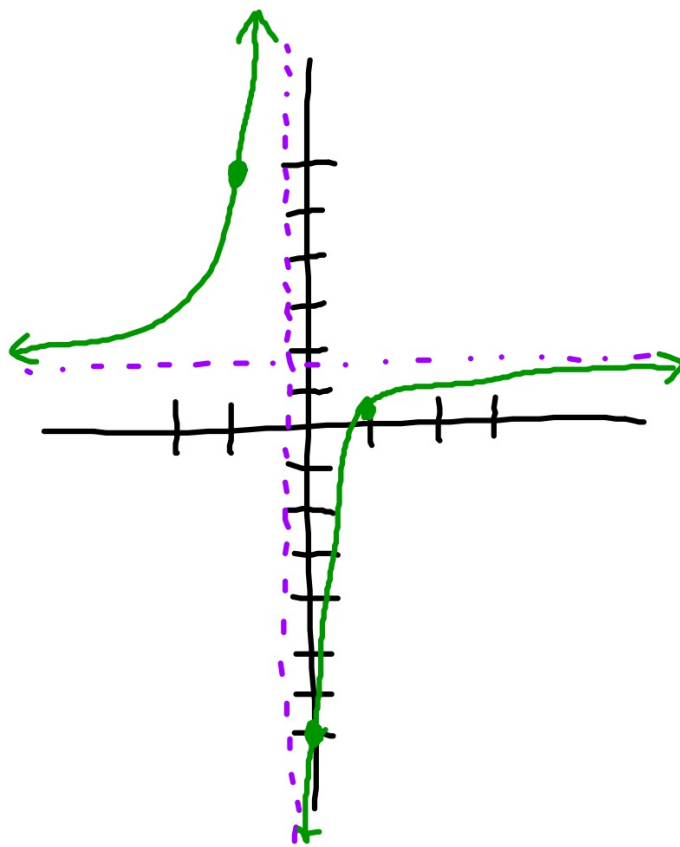
HA:  $y = 5/3$

SA: none

y-int:  $(0, -7)$

$$f(1) = -1/2$$

$$f(-1) = 6$$



$$15.) f(x) = \frac{3x^2 - 8x + 2}{x - 4}$$

Hole: none

VA:  $x = 4$

HA: none

SA:  $y = 3x + 4$

y-int:  $(0, -\frac{1}{2})$

$$f(3) = -5$$

$$f(5) = 37$$

