5.6 Practice Problems

1. Use the graph of the polynomial function to solve the inequalities.
   a. $f(x) \geq 0$

   $+ \quad - \quad + \quad -$
   $-1 \quad 3 \quad 5$

   $(-\infty, -1] \cup [3, 5]$

   b. $f(x) < 0$

   $[-1, 3] \cup [5, \infty)$
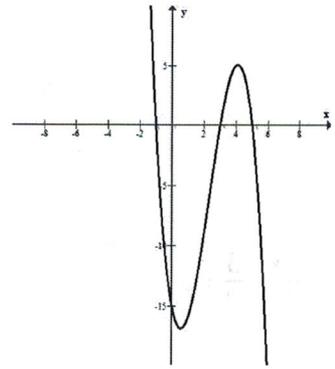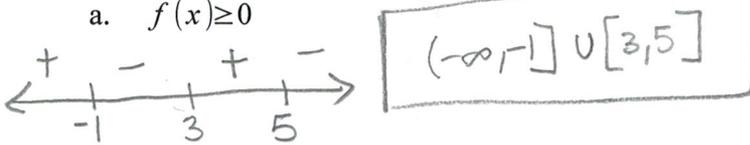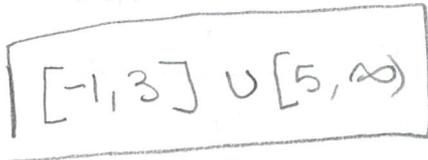
2. Use the graph of the rational function to solve the inequalities.

   a. $f(x) \geq 0$

   $+ \quad - \quad +$
   $-2 \quad 3$

   $(-\infty, -2] \cup (3, \infty)$

   b. $f(x) < 0$

   $[-2, 3)$
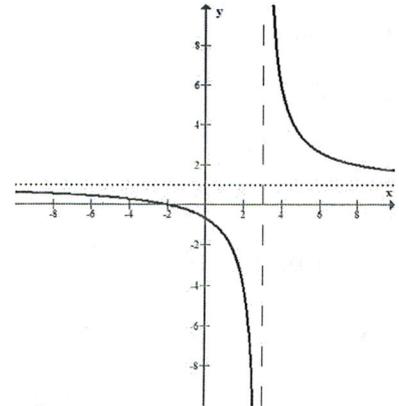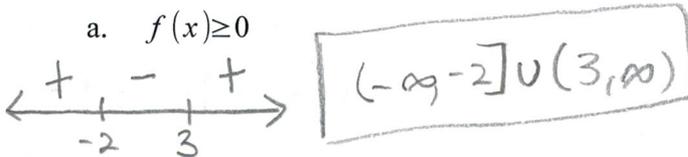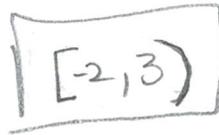
Solve the following inequalities. Write your answer in interval notation.

use graph or sign chart or Test points

3. $(x+1)(x-2)(x+4) > 0$

   $- \quad + \quad - \quad +$
   $-4 \quad -1 \quad 2$

 $(-4, -1) \cup (2, \infty)$
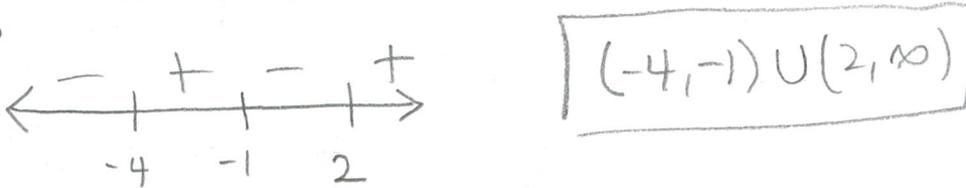
4. $x^3 + 7x^2 - x - 7 < 0$

   $x^2(x+7) - 1(x+7) = 0$

   $(x+7)(x^2-1) = 0$

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

   $x+7=0 \quad x+1=0 \quad x-1=0$

   $x=-7 \quad x=-1 \quad x=1$

   $- \quad + \quad - \quad +$
   $-7 \quad -1 \quad 1$

   $(-\infty, -7) \cup (-1, 1)$

5. $\dfrac{3-x}{x+8}>0$

Number line: $-$ | $+$ | $-$ with points -8 and 3

$\boxed{(-8,3)}$

$3-x=0 \qquad x+8=0$

$x=3 \qquad\qquad -8\ -8$

$\qquad\qquad\qquad x=-8$

X-int ↗ $x=3$

V.A. ↗

6. $\dfrac{2x-3}{3x-7}\le 0$

Number line: $+$ | $-$ | $+$ with points $\frac{3}{2}$ and $\frac{7}{3}$

$\boxed{\left[\dfrac{3}{2},\dfrac{7}{3}\right)}$

$2x-3=0 \qquad 3x-7=0$
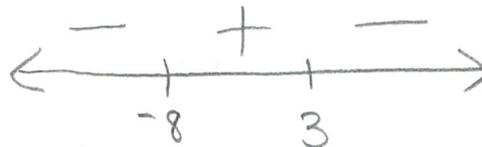
$\dfrac{2x}{2}=\dfrac{3}{2} \qquad \dfrac{3x}{3}=\dfrac{7}{3}$
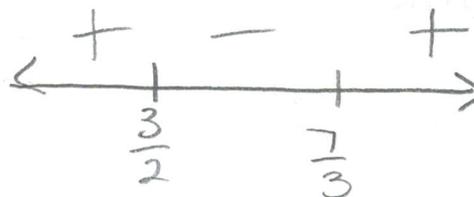
X-int → $x=\dfrac{3}{2} \qquad x=\dfrac{7}{3}$

7. $2x^2+4x+1<0$

$2x^2+4x+1=0$

$x=\dfrac{-4\pm\sqrt{4^2-4(2)(1)}}{2(2)}=\dfrac{-4\pm\sqrt{16-8}}{4}$

$=\dfrac{-4\pm\sqrt{8}}{4}=\dfrac{-4\pm2\sqrt{2}}{4}=\dfrac{-2\pm\sqrt{2}}{2}$

Number line: $+$ | $-$ | $+$ with points $\dfrac{-2-\sqrt{2}}{2}$ and $\dfrac{-2+\sqrt{2}}{2}$
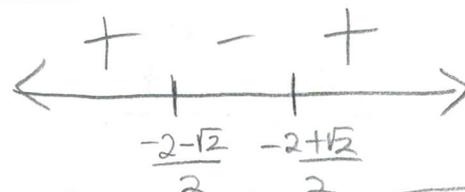
$\boxed{\left(\dfrac{-2-\sqrt{2}}{2},\dfrac{-2+\sqrt{2}}{2}\right)}$

8. $x^2+6x+9\le 0$

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

$x+3=0 \qquad x+3=0$

$x=-3$

Number line: $+$ | $+$ with point -3
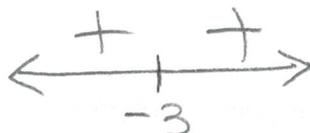
no neg intervals
but $=0$ @ $x=-3$

$\boxed{\{-3\}}$

9. $\dfrac{x-3}{x+8}\le 2$

$\dfrac{x-3}{x+8}-\dfrac{2(x+8)}{(x+8)}\le 0 \qquad \dfrac{-x-19}{x+8}\le 0$

$\dfrac{x-3-2x-16}{x+8}\le 0$

Number line: $-$ | $+$ | $-$ with points -19 and -8
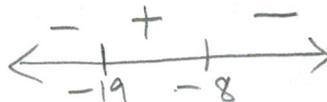
$(-\infty,-19]\cup(-8,\infty)$

10. $9-x^2<0$

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

$3-x=0 \qquad 3+x=0$

$3=x \qquad\qquad x=-3$

Number line: $-$ | $+$ | $-$ with points -3 and 3

$\boxed{(-\infty,-3)\cup(3,\infty)}$