p.208 – 209   HW 3.4 #1

35.) $R(x) = \dfrac{6x^2-7x-3}{2x^2-7x+6} = \dfrac{(3x+1)\cancel{(2x-3)}}{\cancel{(2x-3)}(x-2)} = \dfrac{3x+1}{x-2},\ x \neq 3/2$

$\begin{array}{c|c} -18 & -7 \\ \hline -9, 2 & \end{array}$

$\underbrace{6x^2-9x}+\underbrace{2x-3}$

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

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

$\begin{array}{c|c} 12 & -7 \\ \hline -4, -3 & \end{array}$

$\underbrace{2x^2-4x}-\underbrace{3x+6}$

$2x(x-2)-3(x-2)$

$(2x-3)(x-2)$

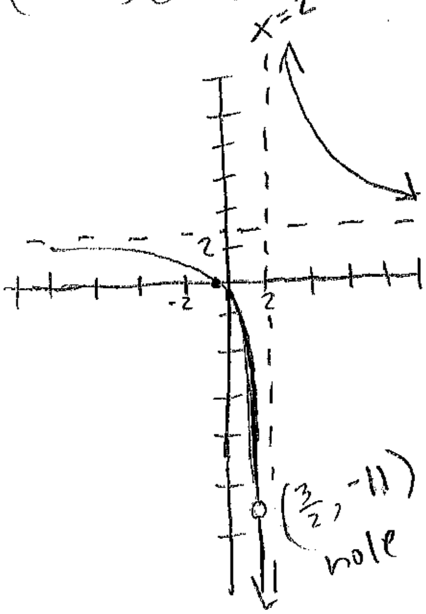
Domain: $\{x \mid x \neq \frac{3}{2}, 2\}$

lowest terms: $\dfrac{3x+1}{x-2},\ x \neq 3/2$

x-int $\rightarrow$ $3x+1=0 \rightarrow \frac{3x}{3} = \frac{-1}{3} \rightarrow \boxed{x = \frac{-1}{3}}$

y-int $\rightarrow$ $R(0) = \dfrac{[3(0)+1][2(0)-3]}{[2(0)-3][0-2]} = \dfrac{(1)(-3)}{(-3)(-2)} = \dfrac{-3}{6} = \dfrac{-1}{2}$

$\boxed{\left(0, -\frac{1}{2}\right) \rightarrow \text{y-int}}$



No symmetry $\rightarrow$ R(-x) does not equal R(x) or -R(x)

VA $\rightarrow$ $x=2$; Hole at $x = \frac{3}{2} \rightarrow \left(\frac{3}{2}, -11\right)$

HA $\rightarrow$ $y = \frac{6}{2} \rightarrow \boxed{y=3}$

* To find out whether R(x) intersects the horizontal asymptote, set R(x) = HA & solve

$$\frac{6x^2-7x-3}{2x^2-7x+6} = 3$$

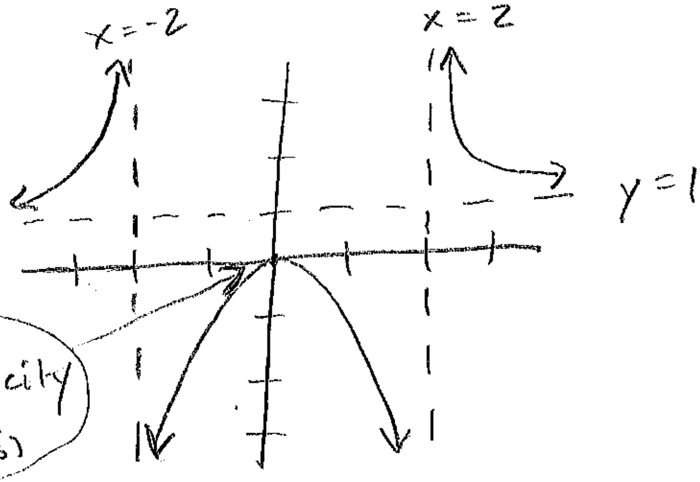
$$\frac{(3x+1)\cancel{(2x-3)}}{\cancel{(2x-3)}(x-2)} = 3$$

$$\frac{3x+1}{x-2} = 3 \rightarrow [\cancel{x-2}]\frac{3x+1}{\cancel{x-2}} = 3[x-2]$$

$$3x+1 = 3x-6$$

$0 \neq -7 \rightarrow$ Not Intersected At HA

51.)



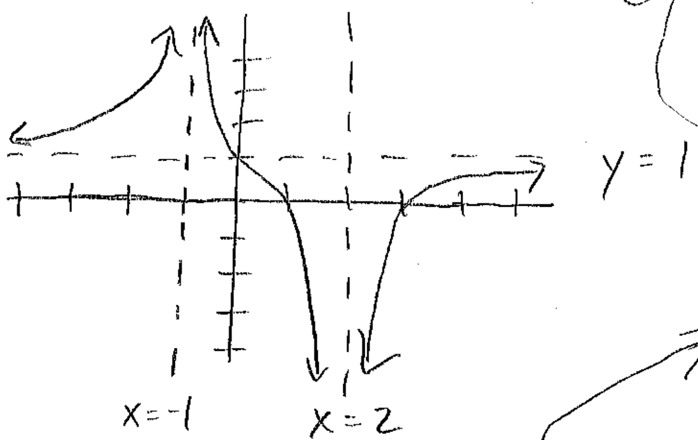
x-int w/multiplicity 2 (touches x-axis)

$$\boxed{R(x) = \frac{x^2}{(x-2)(x+2)}}$$

VA w/mult 1   VA w/mult 1

* HA → y = 1
If you divide the lead coefficients in the eqn to the left, you get 1.

53.)



① x-int → 1, 3 (graph goes through both so odd mult)
y-int → 1

$$R(x) = \frac{(x-1)(x-3)}{(x+1)^2(x-2)^2}$$

② * VA's → x = -1, x = 2

- To the L + R of x = -1, the graph goes to ∞, therefore x = -1 has even multiplicity
- To the L + R of x = 2, the graph goes to -∞, therefore x = 2 has even multiplicity

③ y-int → 1

- To find y-int, sub zero in for x & solve. If we do that with we get $\frac{(-1)(-3)}{(1)(4)} = \frac{3}{4}$, however our y-int is 1, so we have to make n = m since we have HA at y = 1

so $$\boxed{R(x) = \frac{(x-1)(x-3)\left(x^2+\frac{4}{3}\right)}{(x+1)^2(x-2)^2}}$$