Always Factor!

$$g(x) = \frac{2x^2 + x}{2x^3+3x^2 - 3x - 2} = \frac{x(\cancel{2x+1})}{(x-1)(\cancel{2x+1})(x+2)}$$ hole!

can't factor by grouping → $2(1)^3+3(1)^2-3(1)-2$

$2+3-3-2=0$ ✓

$\frac{2}{2}$: $\frac{1,2}{1,2}$ $\pm1, \pm\frac{1}{2}, \pm2$

$(2x+1)(x+2)$

$$\begin{array}{r} 2x^2+5x+2 \\ (x-1)\overline{)2x^3+3x^2-3x-2} \\ -(2x^3-2x^2) \\ \hline 5x^2-3x-2 \\ -(5x^2-5x) \\ \hline 2x-2 \\ 2x-2 \\ \hline 0 \end{array}$$

V.A. $x=1,\ x=-2$

H.A. $y=0$

S.A. none (bottom is bigger, can't divide)

Identify all key features then graph the function.

* can't use grouping!

$$f(x) = \frac{x^3-2x^2-5x+6}{2x^2+8x-10}$$

$2(x^2+4x-5)$

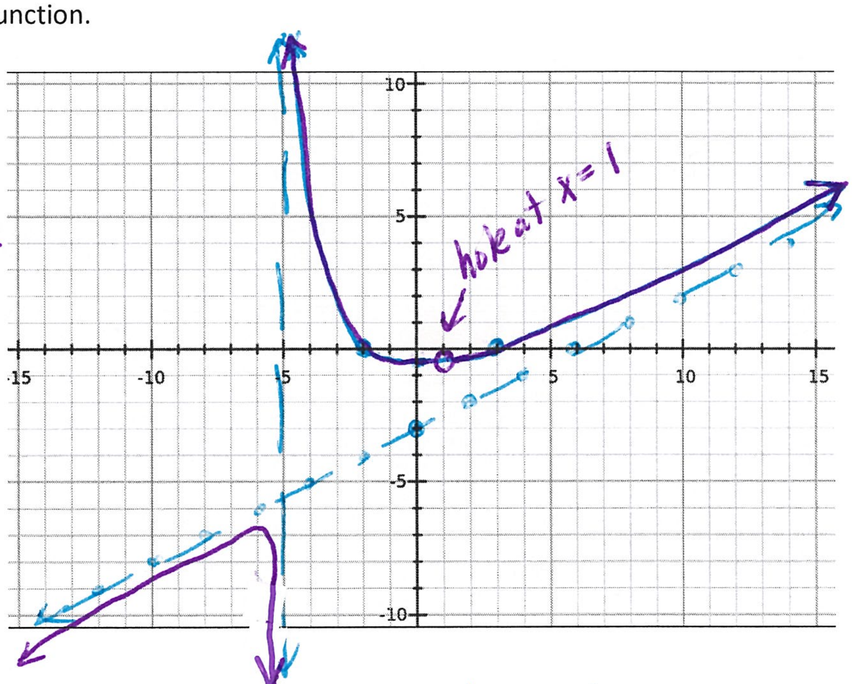
Factored Form: $\frac{(\cancel{x-1})(x-3)(x+2)}{2(x+5)(\cancel{x-1})}$

HA none

VA $x=-5$

SA $y=\frac{1}{2}x-3$

Hole(s) $x=1$



x-intercept(s) $(3,0)\ (-2,0)$

y-intercept(s) $(0,-\frac{3}{5})$

domain $(-\infty,-5)\cup(-5,1)\cup(1,\infty)$

Slant:

$$\begin{array}{r} \boxed{\frac{1}{2}x-3} \\ 2x^2+8x-10\overline{)x^3-2x^2-5x+6} \\ -(x^3+4x^2-5x) \\ \hline -6x^2+6 \\ -6x^2+24x+3 \\ \hline -24x-2 \end{array}$$

$1^3-2(1)^2-5(1)+6$

$1-2-5+6=0$ ✓

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

$$\begin{array}{r} x^2-x-6 \\ (x-1)\overline{)x^3-2x^2-5x+6} \\ -(x^3-x^2) \\ \hline -x^2-5x+6 \\ -(-x^2+x) \\ \hline -6x+6 \end{array}$$