$(2,3)$, $(-5,23)$

$m = \frac{y_2 - y_1}{x_2 - x} = \frac{23-3}{-5-2} = \frac{20}{-7}$

$y = -\frac{20}{7}(x-2)+3$

$y = m(x-x_1)+y_1$

§3.6 #s 62, 70, 84, 86, 90, 92, 95,* 97

Do a BUNCH of odd ones.

* Test Point method is less efficient.
I use (maybe) one ~~test~~ test point and then
analyze it using my UNDERSTANDING.

$$\frac{17x^3+2x+5}{2-3x+2x^3}$$

H.A. $y=\frac{17}{2}$ is horizontal asymptote

When degree of numerator is greater than the degree of the denominator, we get an oblique asymptote, which we find by division

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

Improper, with "top bigger than the bottom"

$$\begin{array}{r|l}
 & x - 3 \quad r5 \\
x+2 & x^2 - x - 1 \\
 & -(x^2 + 2x) \\ \hline
 & -3x - 1 \\
 & -(-3x - 6) \\ \hline
 & 5
\end{array}$$

This says

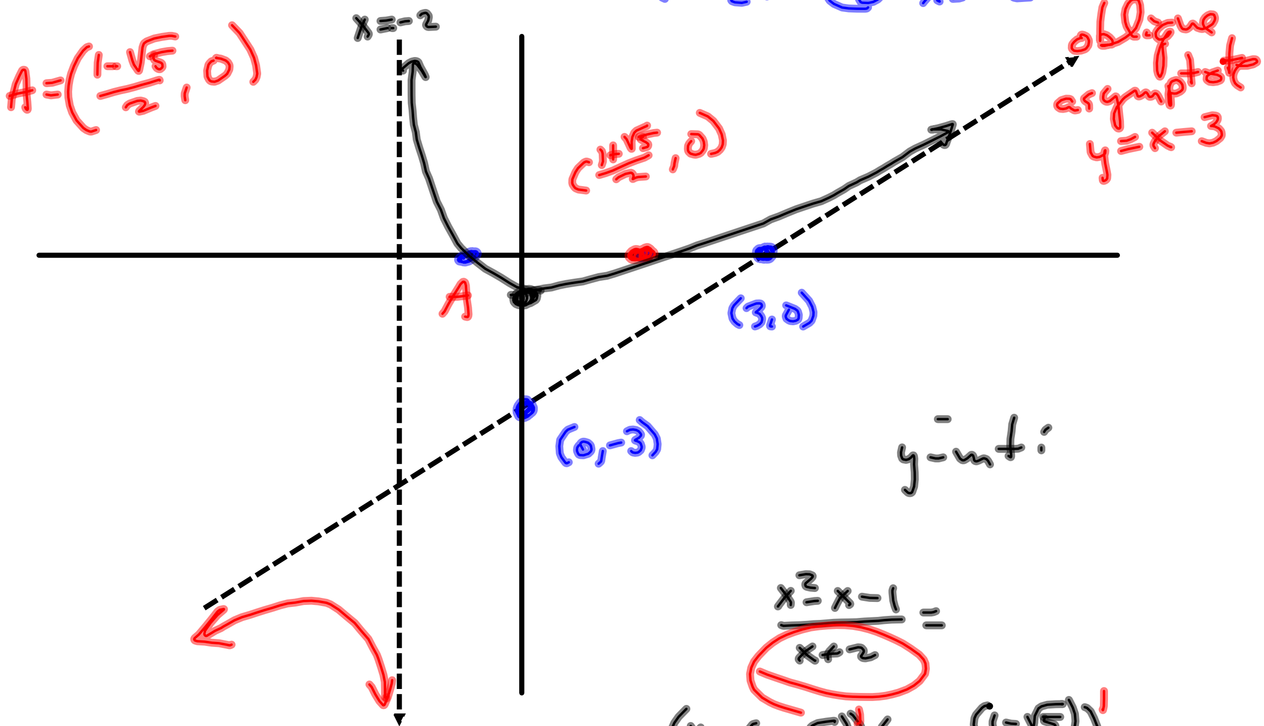
$$R(x) = x - 3 + \frac{5}{x+2}$$

x^2 downstairs on some homework, so synthetic division doesn't always work

$$\begin{array}{r|rrr}
-2 & 1 & -1 & -1 \\
 & & -2 & 6 \\ \hline
 & 1 & -3 & 5
\end{array}$$

$$R(x) = x - 3 + \frac{5}{x+2}$$

Looks like $x-3$ with a zit @ $x=-2$



y-int:

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

$$= \frac{\left(x - \frac{(1+\sqrt{5})}{2}\right)\left(x - \frac{(1-\sqrt{5})}{2}\right)}{x+2}$$

Oct 22-10:19 AM

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

$\mathcal{D} = \{x \mid x \neq -2\}$

V.A. : $x = -2$ (provided $x = -2$ doesn't make $\underline{R(x) = 0}$)

$R(x) = 0 \Rightarrow$

$$x^2 - x - 1 = 0$$

$$x^2 - 1x + \left(-\tfrac{1}{2}\right)^2 = 1 + \tfrac{1}{4}$$

$$\left(x - \tfrac{1}{2}\right)^2 = \tfrac{1}{4} + 1 = \tfrac{5}{4}$$

$$x - \tfrac{1}{2} = \pm \frac{\sqrt{5}}{2}$$

$$x = \frac{1}{2} \pm \frac{\sqrt{5}}{2}$$

$\nearrow \dfrac{1+\sqrt{5}}{2}$

$\searrow \dfrac{1-\sqrt{5}}{2}$

```
(1+√(5))/2
     1.618033989
(1-√(5))/2
    -.6180339887
```

Oct 22-11:02 AM

$$R(x) = \frac{3x^2 - 5x - 2}{x^2 + 5x} = \frac{(x-2)(3x+1)}{x(x+5)}$$

$$M(x) = \frac{3x^3 - 2x^2 - 7x - 2}{x^3 + 6x^2 + 5x} =$$

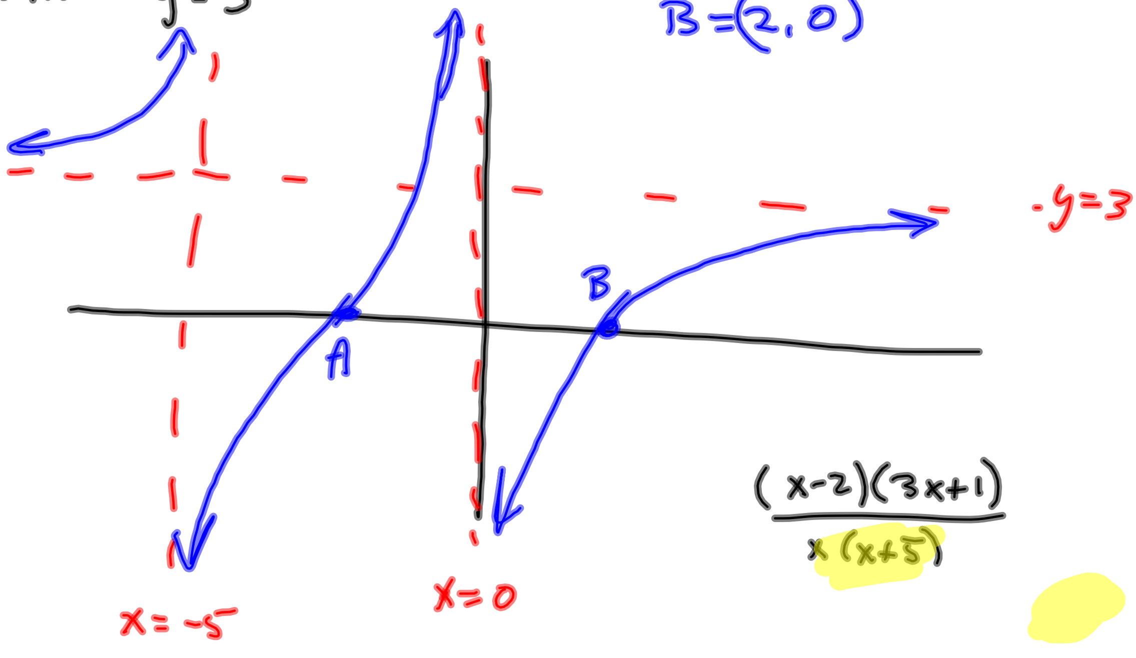
$R(x)$: $\mathcal{D} = \{x \mid x \neq -5 \text{ AND } x \neq 0\}$

zeros: $x = 2$, $x = -\frac{1}{3}$

H.A.: $y = 3$

$A = (-\frac{1}{3}, 0)$

$B = (2, 0)$



$$\frac{(x-2)(3x+1)}{x(x+5)}$$

Oct 22-10:39 AM

$$R(x) = \frac{3x^2-5x-2}{x^2+5x} = \frac{(x-2)(3x+1)}{x(x+5)}$$

$$M(x) = \frac{3x^3-2x^2-7x-2}{x^3+6x^2+5x} = \frac{(x-2)(3x+1)(x+1)}{x(x+5)(x+1)}$$

Scratch:

$x(x^2+6x+5)$

$= x(x+5)(x+1)$ Check

Evaluate this part @ $x=-1$

There's a hole in it @ $x=-1$ where?

wild guess: $x+1$ is a factor of the numerator.

Plug $x=-1$ into $R(x)=M(x)$ in lowest terms

$$\begin{array}{r|rrrr} -1 & 3 & -2 & -7 & -2 \\ & & -3 & 5 & 2 \\ \hline & 3 & -5 & -2 & 0 \end{array}$$

sweet

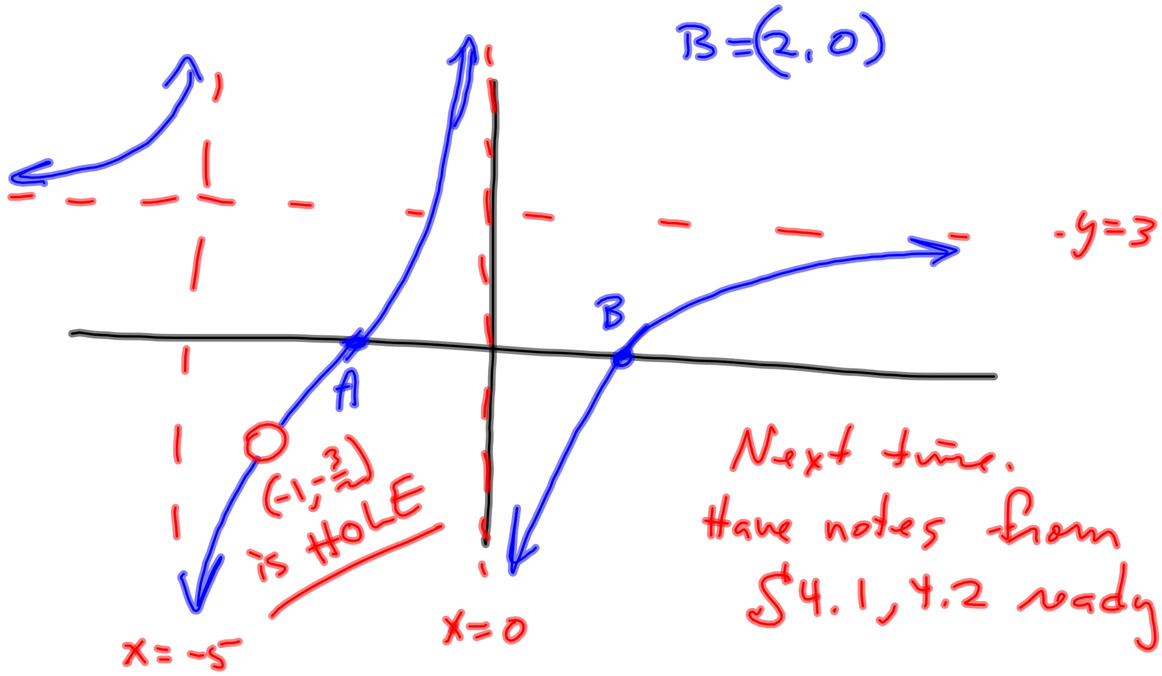
$(3x^2-5x-2)(x+1)$

$$R(-1) = \frac{(-1-2)(3(-1)+1)}{(-1)(-1+5)}$$

$$= \frac{(-3)(-2)}{(-1)(4)} = \frac{6}{-4} = -\frac{3}{2}$$

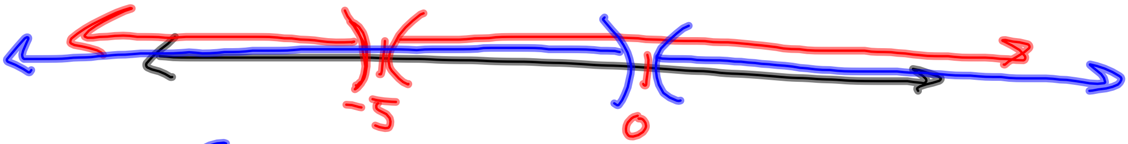
A graph of $M(x)$:

$A = (-\frac{1}{3}, 0)$
$B = (2, 0)$



Next time.
Have notes from §4.1, 4.2 ready.

v



$$= \{x \mid x \neq -5\} \cap \{x \mid x \neq 0\}$$

$$(-\infty, -5) \cup (-5, 0) \cup (0, \infty)$$

Oct 22-10:44 AM