Advanced Math

2-7

(Day 2)

Slant Asymptotes

slant asymptotes: Given the rational function $f(x) = \dfrac{p(x)}{q(x)}$

a: if degree of $q(x)$ is one less than the degree of $p(x)$, there is a slant asymptote.

To find it, take $q(x)\overline{)p(x)}$ and ignore the remainder.

Sketch the graph of the rational function. As sketching aids, use zeros, y-intercepts, asymptotes, and symmetry.

73) $f(x) = \dfrac{x^3}{x^2 - 1}$

domain: $\mathbb{R}$ except $\{\pm 1\}$

vert: $x = \pm 1$

Look for zero on the bottom.
Check for holes (factors).

horiz: none

slant: $x^2 + 0x - 1 \overline{)\, x^3 + 0x^2 + 0x + 0}$

$- \; x^3 + 0x^2 - x$

$x + 0$

$y = x$

$m = 1$

$b: (0,0)$

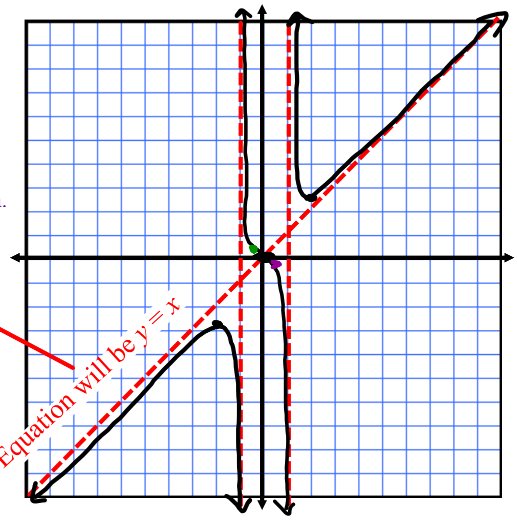
Ignore remainder
for slant asymptotes.

y-int: $(0,0)$

zeros: $\{0\}$

x	y
-2	$\frac{-8}{3}$
2	$\frac{8}{3}$

x	y
$\frac{1}{2}$	$\dfrac{1/8}{-3/4} = -1/6$
$-\frac{1}{2}$	$\dfrac{-1/8}{-3/4} = 1/6$



Sketch the graph of the rational function. As sketching aids, use zeros, y-intercepts, asymptotes, and symmetry.

*) $f(x) = \dfrac{x^2 + x - 6}{x^2 + 5x + 6} = \dfrac{\cancel{(x+3)}(x-2)}{\cancel{(x+3)}(x+2)}$

To find the location of the hole,
put the x value into the reduced equation.

$\left(-3, \frac{-5}{-1}\right)$

domain: $\mathbb{R}$ except $\{-3, -2\}$

Even though the $x + 3$ s cancel
they can't be part of the domain.

vert: $x = -2$

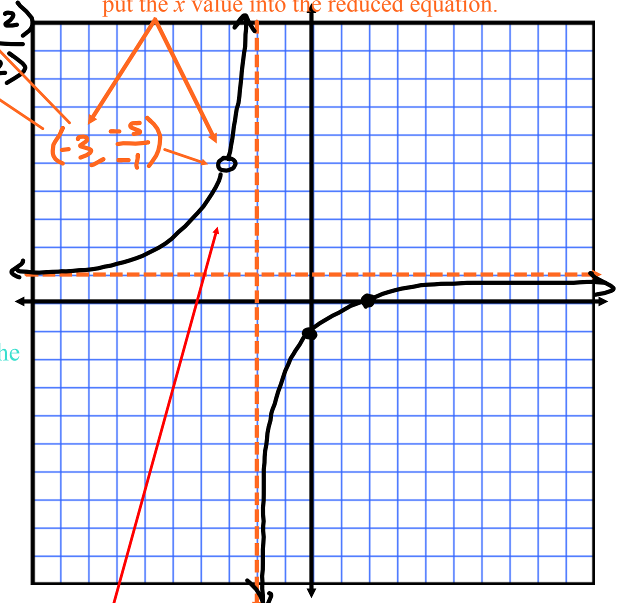
hole at $x = -3$

It is a hole because the
factors reduce.

horiz: $y = 1$

y-int: $(0, -1)$

zeros: $\{2\}$



Because the hole is in the top left
quadrant, we know the graph will
be drawn there without plotting a point.

Assignment

pg. 280

50-54 even,

70-74 even,

H1) $H(x) = \dfrac{x^2 - x - 12}{x^2 + x - 20}$

H2) $R(x) = \dfrac{x^3 + 2x^2 - 5x - 6}{x^2 - 4}$