

Homework: Calc Honors Rational Sketching ①

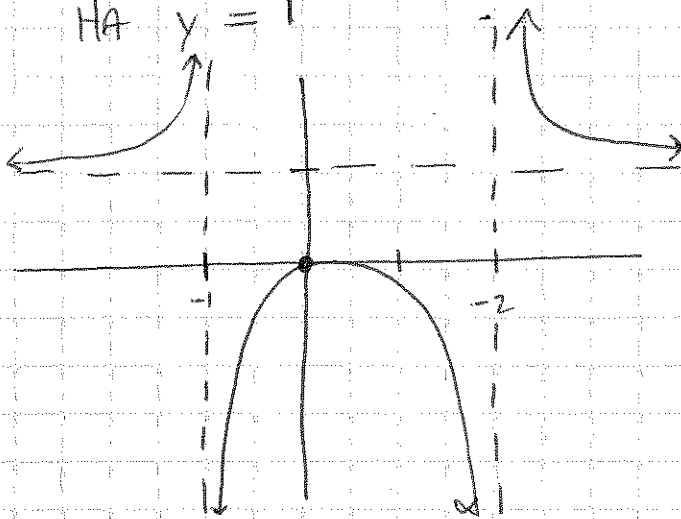
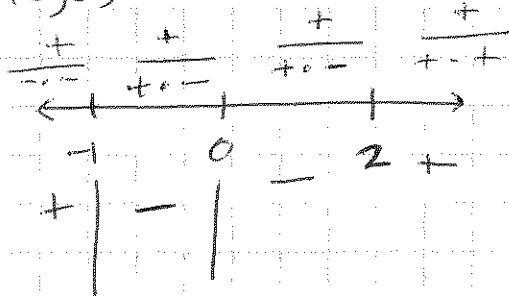
1.) $y = \frac{x^2}{x^2 - x - 2} = \frac{x^2}{(x+1)(x-2)}$

Int: $x=0 \rightarrow y=0 \quad (0,0)$

Holes: No

VA: $x = -1, 2$

HA: $y = 1$



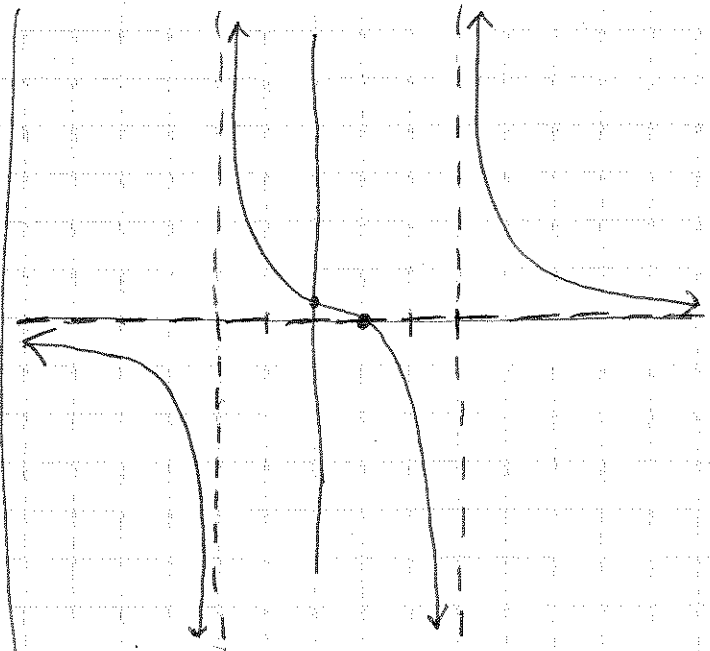
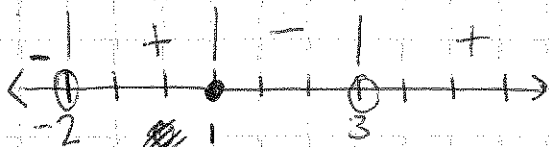
2.) $y = \frac{x-1}{x^2 - x - 6} = \frac{x-1}{(x+2)(x-3)}$

Holes: n/a

Int: $(1,0), (0, \frac{1}{6})$

VA: $x = -2, 3$

HA: $y = 0$



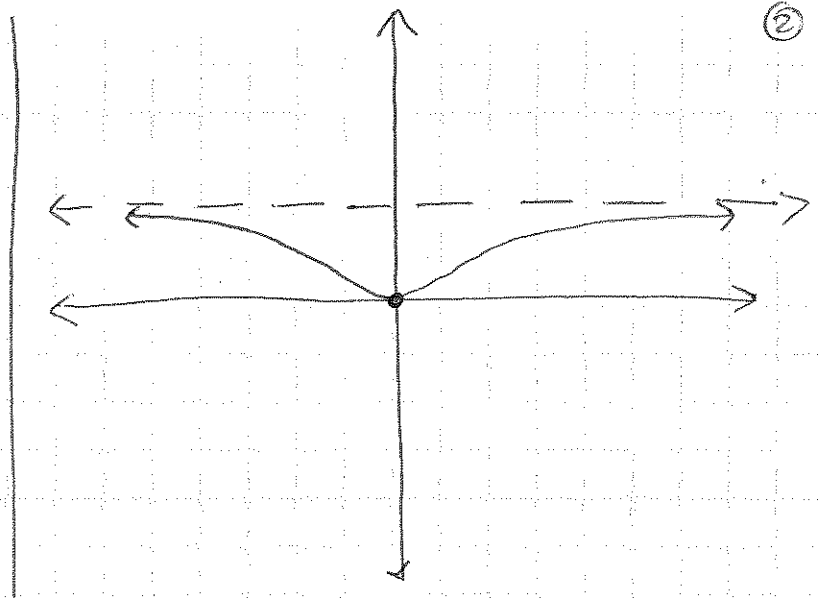
3.) $y = \frac{2x^4}{x^4 + 1}$

Int: $x=0 \rightarrow y=0$

Hole: No

VA: N/A

HA: $y=2$



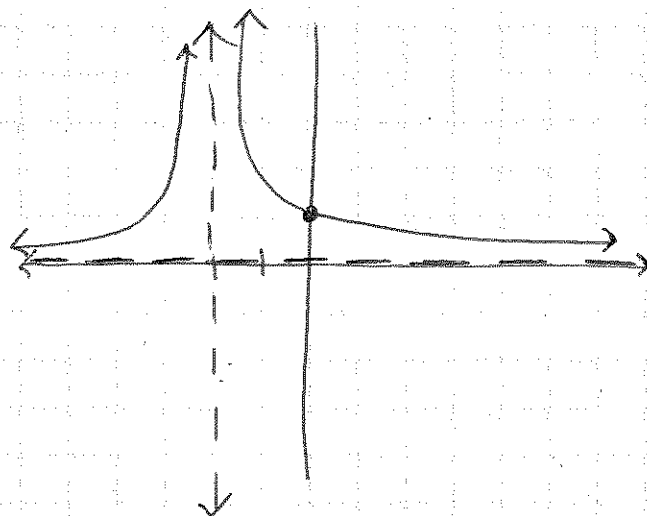
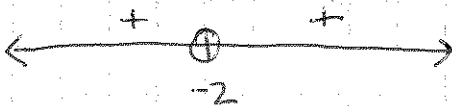
4.) $y = \frac{4}{(x+2)^2}$

int: $x=0 \rightarrow y=1$ (0,1)

Hole: no

VA: $x=-2$

HA: $y=0$



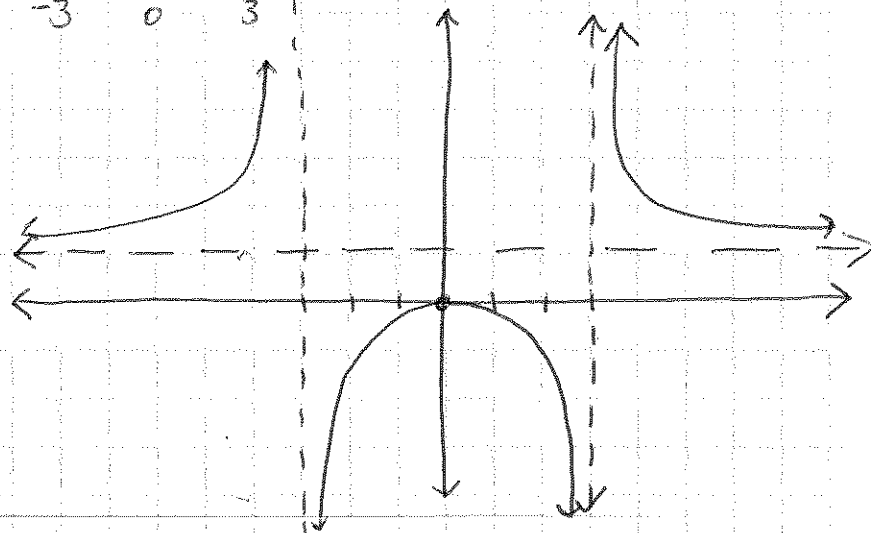
5.) $y = \frac{x^2}{x^2 - 9}$
 $= \frac{x^2}{(x-3)(x+3)}$

int: $x=0, y=0$ (0,0)

Hole: none

VA: $x=\pm 3$

HA: $y=1$



6.) $y = \frac{(x+2)(x+3)^2}{(x+3)(x+3)}$

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

Hole: $x = -3 \rightarrow y = 0; (-3, 0)$

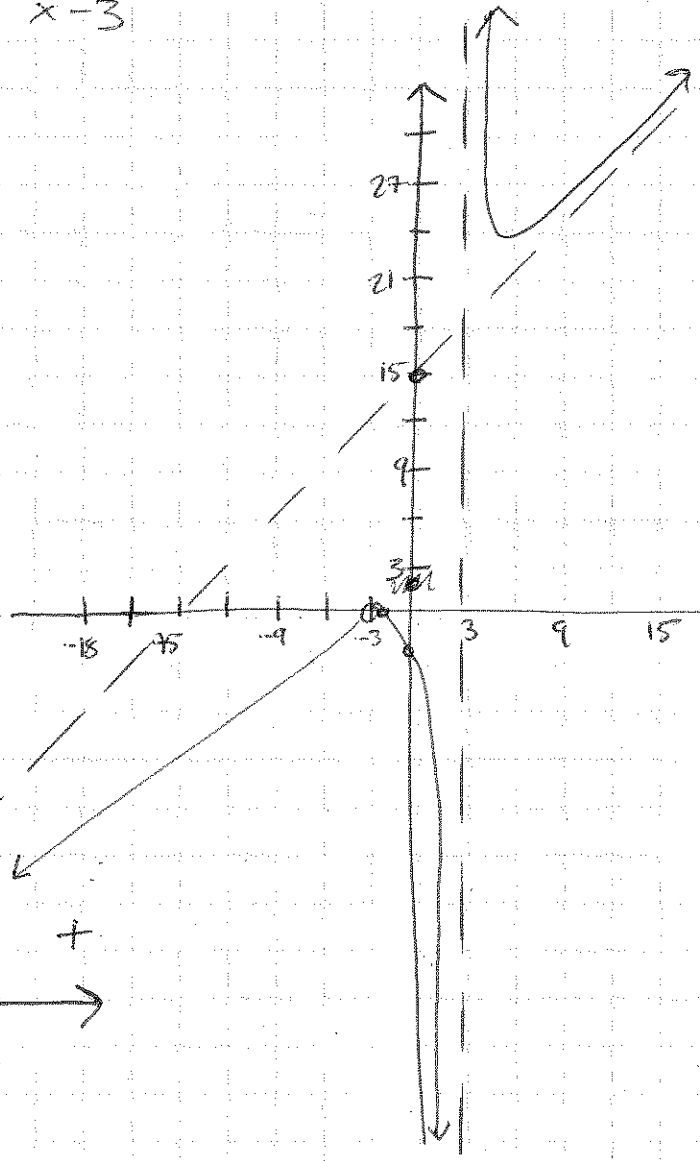
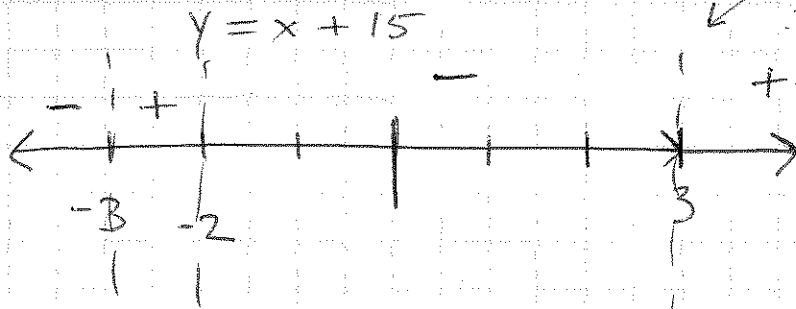
Int: $x = 0 \rightarrow y = 2; (0, 2)$

$y = 0 \rightarrow x = -2 (-2, 0)$

VA: $x = 3$

HA: none $\rightarrow \frac{x^3}{x^2} \rightarrow x$

SA:
$$\begin{array}{r|rr} 3 & 1 & 5 & 6 \\ & & 3 & 45 \\ \hline & 1 & 15 & 54 \end{array}$$



7.) $y = x^2 + \frac{1}{x} = \frac{x^3 + 1}{x} = y$

Hole: None

Int: $x = 0 \rightarrow \text{undef}$
 $y = 0 \rightarrow x = -1 (-1, 0)$

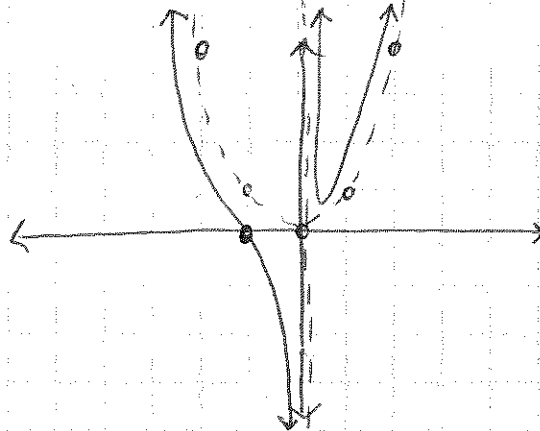
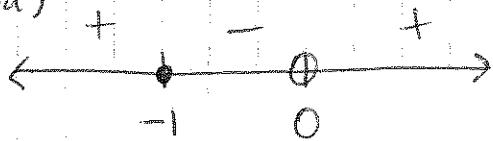
VA: $x = 0$

SA \rightarrow

$$\begin{array}{r} x^2 \\ x \overline{) x^3 + \quad + \quad + \quad + 1} \\ \underline{-x^3} \\ \end{array}$$

$y = x^2$

7 cont'd)



4

$$8.) f(x) = \frac{x^4 - 1}{x^2 - 4} = \frac{(x^2 - 1)(x^2 + 1)}{(x + 2)(x - 2)} = \frac{(x + 1)(x - 1)(x^2 + 1)}{(x + 2)(x - 2)}$$

Holes: None

Ints: $x=0 \rightarrow y = \frac{1 \cdot -1 \cdot 1}{2 \cdot -2} = \frac{1}{4} \quad (0, \frac{1}{4})$

$y=0 \rightarrow x = \pm 1 \quad (1, 0), (-1, 0)$

VA: $x = \pm 2$

HA: none

SA: none

$$\begin{array}{r|l} 2 & \begin{array}{cccc|c} 1 & 0 & 0 & 0 & -1 \\ & 2 & 4 & 8 & 16 \end{array} \\ -2 & \begin{array}{cccc|c} 1 & 2 & 4 & 8 & 15 \\ & -2 & 0 & -8 & \end{array} \end{array}$$

$$1 \ 0 \ 4 \ | \ 0$$

$x^2 + 4 = y \rightarrow QA$

