

Vertical asymptote: $x = \text{set denominator} = 0$ y-intercept: substitute 0 for x
 Horizontal asymptote: $y = \text{constant term}$ x-intercept: substitute 0 for y

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QI and III: positive fraction
 QII and IV: negative fraction

Date _____
 Pre Calculus

Sketching Rational Functions

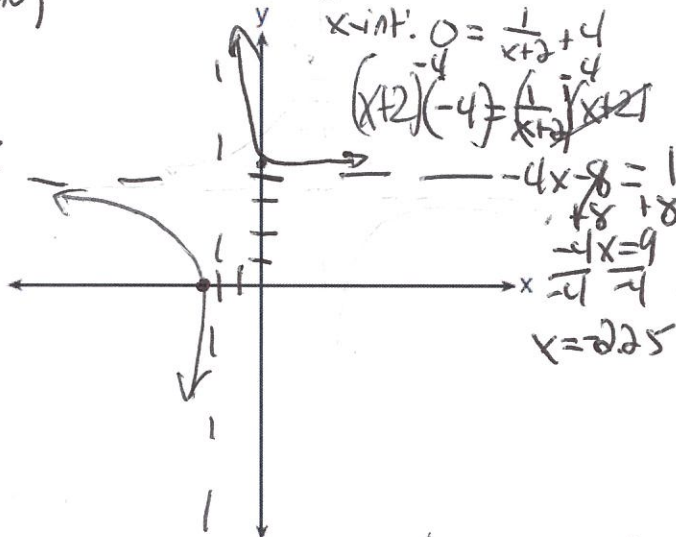
~~VA: $x-3=0$~~
 $x=3$

VA: $x = -2$
 HA: $y = 4$

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

y-int: (0, 4.5)
 x-int: (-2, 5, 0)

Positive:
 I and III



VA: $x+2=0$
 $x = -2$

y-int: $y = \frac{1}{2} + 4 = 4.5$

x-int: $0 = \frac{1}{x+2} + 4$

$(x+2)(-4) = \frac{1}{x+2}$

$-4x - 8 = 1$
 $-4x = 9$
 $x = -2.25$

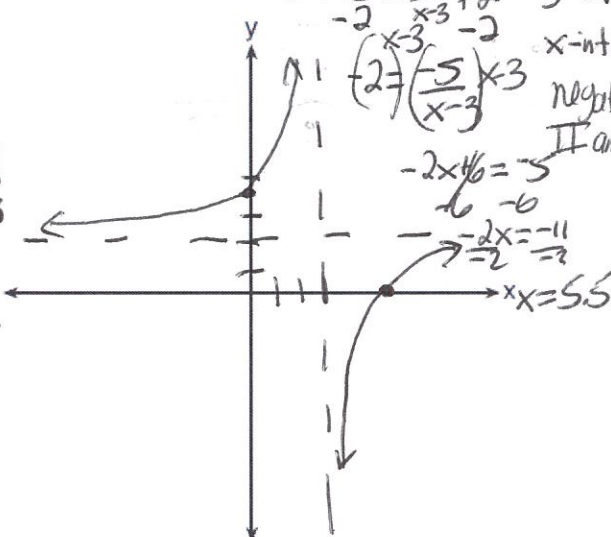
2. $y = \frac{-5}{x-3} + 2$

y-int: $y = \frac{-5}{-3} + 2$
 $y = \frac{11}{3}$

x-int: $0 = \frac{-5}{x-3} + 2$
 $(-2)(x-3) = -5$
 $-2x + 6 = -5$
 $-2x = -11$
 $x = 5.5$

VA: $x = 3$
 HA: $y = 2$

y-int: (0, 11/3)
 x-int: (5.5, 0)
 negative:
 II and IV



VA: $x-6=0$
 $x = 6$

y-int: $\frac{4}{3} - \frac{4}{6} = \frac{11}{3}$

x-int: $0 = 3 - \frac{4}{x-6}$

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

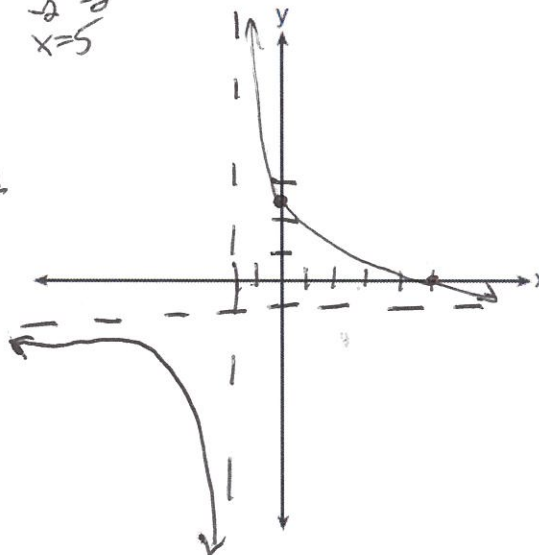
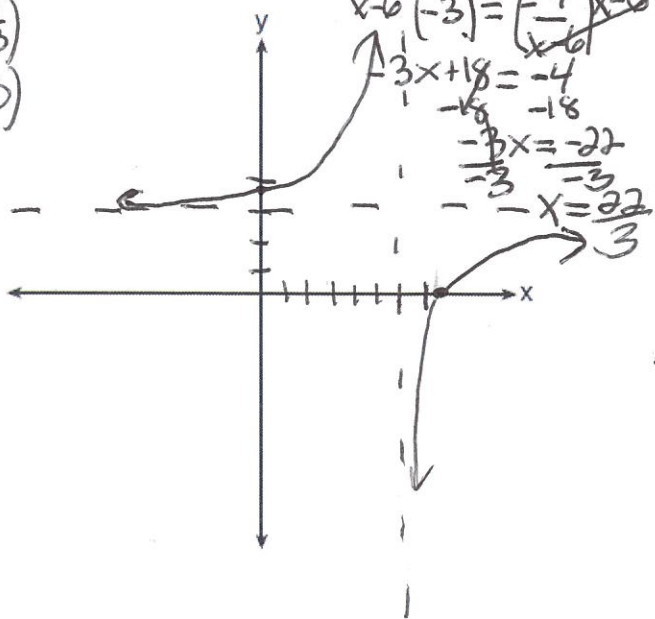
$3x + 18 = -4$
 $3x = -22$
 $x = -\frac{22}{3}$

4. $y = -1 + \frac{7}{x+2}$
 x-int: $0 = -1 + \frac{7}{x+2}$
 $(1)(x+2) = 7$
 $x+2 = 7$
 $x = 5$

y-int: $y = -1 + \frac{7}{2} = 2.5$

VA: $x = -2$
 HA: $y = -1$

y-int: (0, 2.5)
 x-int: (5, 0)
 positive
 I and III



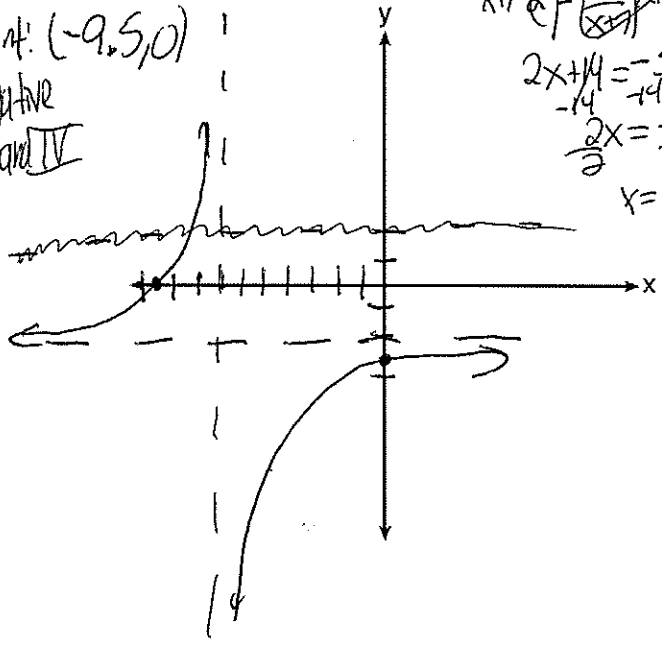
3. $y = 3 - \frac{4}{x-6}$

VA: $x = 6$
 HA: $y = 3$
 y-int: (0, 11/3)
 x-int: (22/3, 0)

Negative:
 II and IV

VA: $x = -7$
 HA: $y = -2$
 y-int: $(0, -\frac{19}{7})$
 x-int: $(-9.5, 0)$

negative
 II and IV



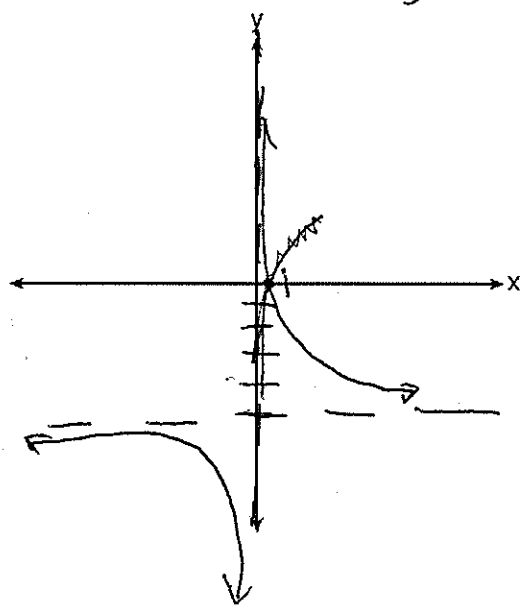
VA: $x+7=0$
 $x = -7$
 y-int: $y = \frac{-5}{7} - 2$
 $y = -\frac{19}{7}$

x-int: $0 = \frac{-5}{x+7} - 2$
 $+2$ $+2$
 $x+7 = \frac{-5}{x+7} - 2$
 $2x+14 = -5$
 -14 $+4$
 $2x = -19$
 $x = -9.5$

y-int: $\frac{2}{5} - 5$
 undefined, no y-int
 x-int: $0 = \frac{2}{x} - 5$
 $+5$ $+5$
 $\frac{2}{x} = 5$
 $2 = 5x$
 $x = \frac{2}{5}$

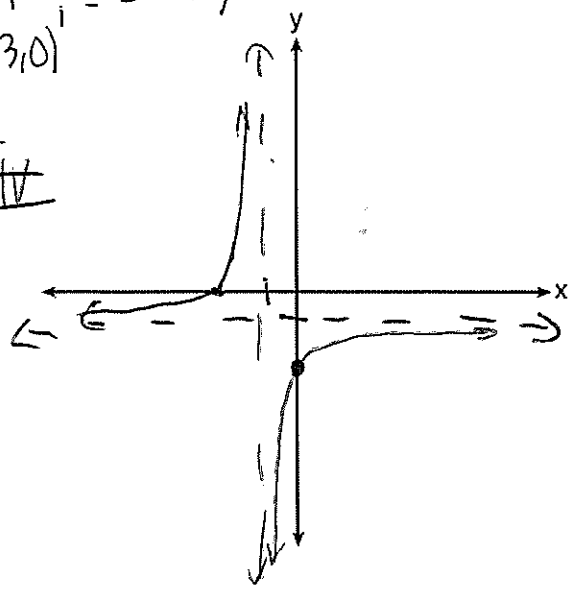
6. $y = \frac{2}{x} - 5$

VA: $x = 0$
 HA: $y = -5$
 x-int: $(\frac{2}{5}, 0)$
 y-int: None
 positive
 I and III



VA: $x = -1$
 HA: $y = -1$
 y-int: $1 - \frac{2}{1} = -3$ (0, -3)
 x-int: $(-3, 0)$

negative
 II and IV



VA: $x+1=0$
 $x = -1$
 x-int: $0 = \frac{-1}{x+1} - \frac{2}{x+1}$
 $+1$ $+1$
 $x+1 = \frac{-1}{x+1} - \frac{2}{x+1}$
 $x+1 = -2$
 $x = -3$

8. $y = \frac{-1}{x-6}$
 VA: $x-6=0$
 $x = 6$
 HA: $y = 0$
 x-int: $(0) = \frac{-1}{x-6}$
 $0 \neq 1$ No solution

VA: $x-6=0$
 $x = 6$
 y-int: $y = \frac{-1}{-6} = \frac{1}{6}$

VA: $x = 6$
 HA: $y = 0$
 y-int: $(0, \frac{1}{6})$
 x-int: None
 negative
 II and IV

