Pre-Calculus: Graphing Rational Functions Name KEY

Day 5 – Slant Asymptotes Date_____ Per_____

Identify all key features of the rational functions below, then graph those functions.

1) $f(x) = \frac{x^2+10x+25}{x+4} = \frac{(x+5)(x+5)}{x+4}$

x-intercept(s) $(-5,0)$
$x+5=0$

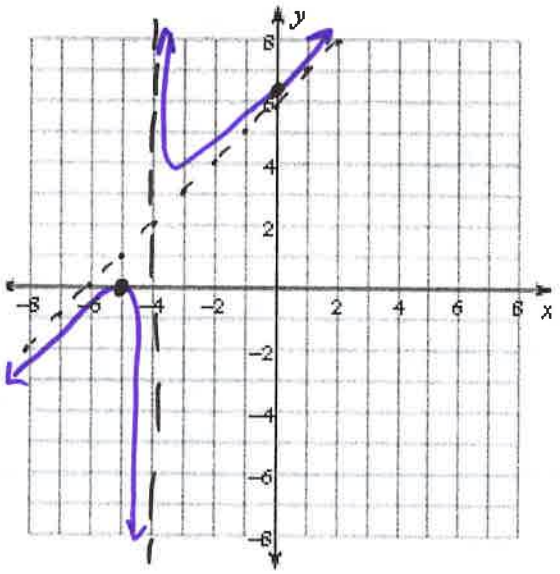
y-intercept $(0, 6.25)$
$f(0) = \frac{0+0+25}{0+4} = \frac{25}{4}$

Vertical Asymptote(s) $x=-4$
$x+4=0$

Holes None

End Behavior $y = x+6$
$n=2$ $m=1$
$n>m$
DIVIDE

$$\begin{array}{r|ccc} -4 & 1 & 10 & 25 \\ & \downarrow & -4 & -24 \\ \hline & 1 & 6 & (1)\ \text{Remainder} \end{array}$$



2) $f(x) = \frac{x^2+9x+20}{x-3} = \frac{(x+4)(x+5)}{x-3}$

x-intercept(s) $(-4,0)(-5,0)$
$x+4=0$
$x+5=0$

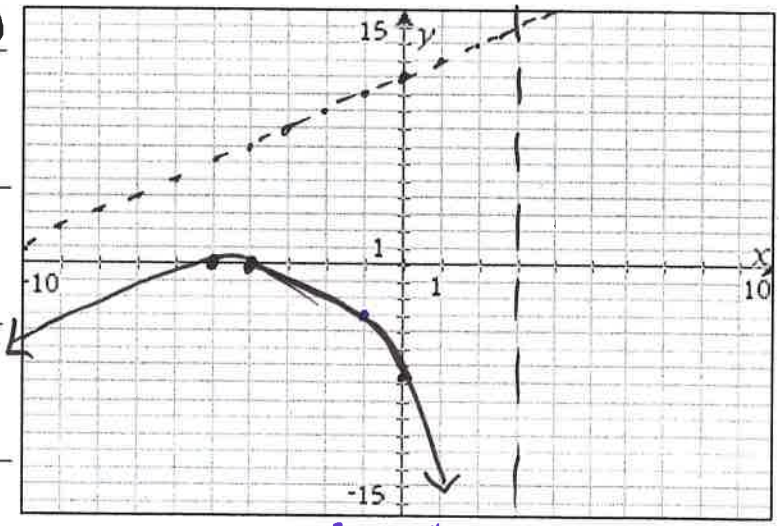
y-intercept $(0, -6.7)$
$f(0) = \frac{0+0+20}{0-3} = \frac{20}{-3}$

Vertical Asymptote(s) $x=3$

Holes None

End Behavior $y = x+12$
$n=2$
$m=1$ $n>m$

$$\begin{array}{r|ccc} 3 & 1 & 9 & 20 \\ & \downarrow & 3 & 36 \\ \hline & 1 & 12 & (56)\ R \end{array}$$



$f(\underset{x}{-1}) = \frac{(\overset{3}{-1}+4)(\overset{4}{-1}+5)}{-1-3} = \frac{12}{-4} = \underset{y}{-3}$

3) $f(x) = \frac{3x^2}{x+4}$

x-intercept(s) (0,0)
$3x^2 = 0$

y-intercept (0,0)
$f(0) = \frac{0}{0+4}$

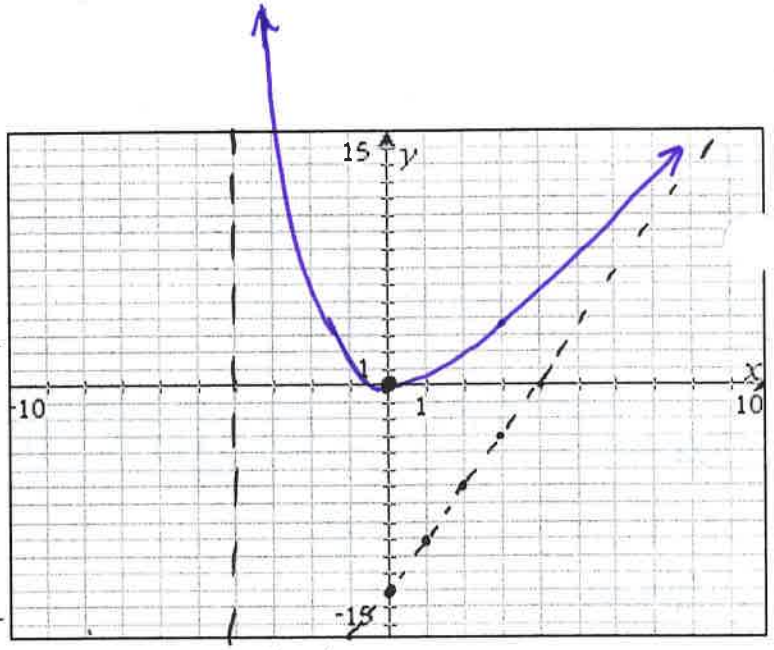
Vertical Asymptote(s) $x = -4$

Holes None

End Behavior $y = 3x - 12$

$n = 2 \quad m = 1$
$n > m$

$$-4 \;\big|\; 3 \quad 0 \quad 0$$
$$\downarrow \quad -12 \quad 48$$
$$3 \quad -12 \quad (48)\ R$$



$f(-3) = \frac{3(-3^2)}{-3+4} = \frac{27}{1} = 27$
(x, y)

$f(3) = \frac{3(3^2)}{3+4} = \frac{27}{7} = 3.9$
(x, y)

4) $f(x) = \frac{x^2-9}{x+2}$

x-intercept(s) (-3,0) (3,0)
$x^2 - 9 = 0$
$\sqrt{x^2} = \sqrt{9} \quad x = \pm 3$

y-intercept (0, -4.5)
$f(0) = \frac{0-9}{0+2} = \frac{-9}{2}$

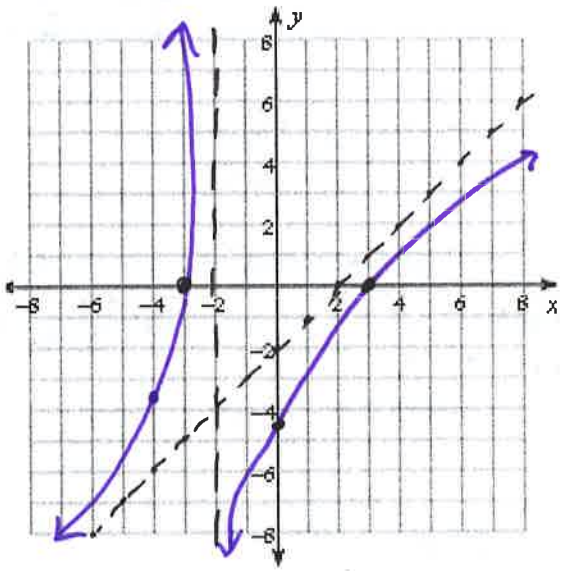
Vertical Asymptote(s) $x = -2$

Holes None

End Behavior $y = x - 2$

$n = 2 \quad m = 1$
$n > m$

$$-2 \;\big|\; 1 \quad 0 \quad -9$$
$$\downarrow \quad -2 \quad 4$$
$$1 \quad -2 \quad (-5)\ R$$



$f(-4) = \frac{(-4^2)-9}{-4+2} = \frac{7}{-2} = -3.5$
(x, y)