6.7 - Graphs of Rational Functions

Identify points of discontinuity, holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each.

1. $f(x) = \frac{1}{3x^2+3x-18} = \frac{1}{3(x^2+x-6)} = \frac{1}{3(x+3)(x-2)}$

Hole: none
VA: $x=-3$ and $x=2$
x-int: none
HA: $y=0$

2. $f(x) = \frac{x-2}{x-4}$ Hole: none x-int: (2,0)
VA: $x=4$ HA: $y=1$

3. $f(x) = \frac{x^3-x^2-6x}{-3x^2-3x+18} = \frac{x(x-3)(x+2)}{-3(x+3)(x-2)}$
$-3(x^2+x-6)$

Hole: none
VA: $x=-3$ and $x=2$
x-int: (0,0) (3,0) (-2,0)
HA: None

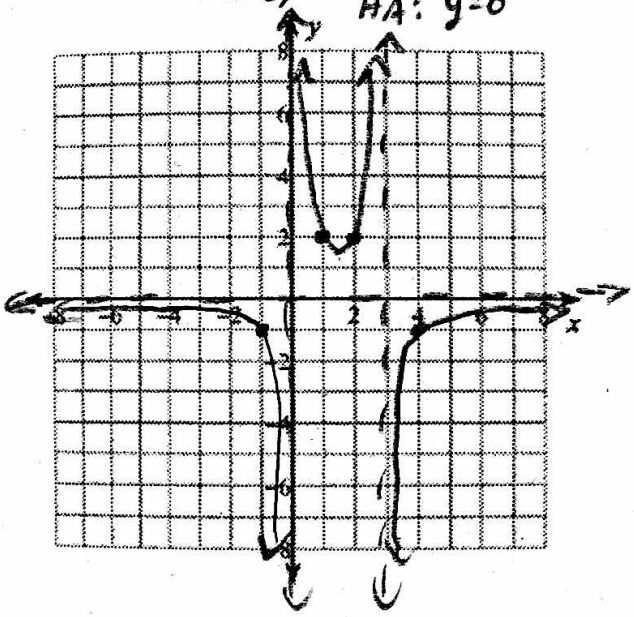
4. $f(x) = \frac{x^2+x-6}{-4x^2-16x-12} = \frac{(x+3)(x-2)}{-4(x+3)(x+1)}$
$-4(x^2+4x+3)$

Hole: $x=-3$
VA: $x=-1$
x-int: (2,0)
HA: $y=-1/4$

Identify points of discontinuity, holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each. Then sketch the graph.

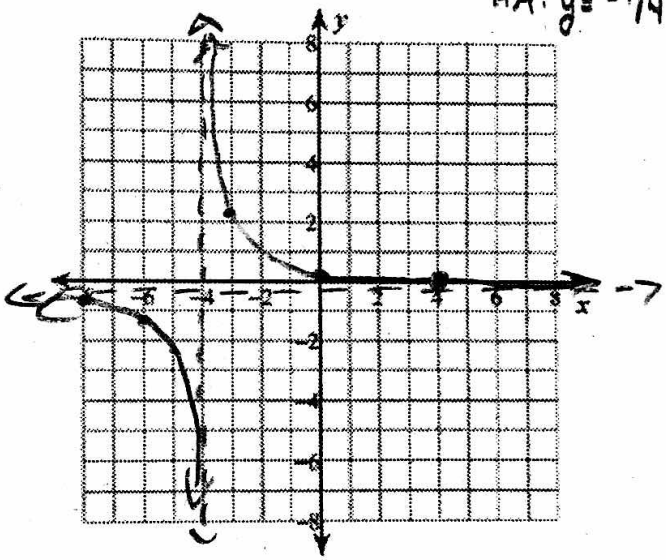
5. $f(x) = -\frac{4}{x^2-3x}$ $x(x-3)$

Hole: none
VA: $x=3$, $x=0$
x-int: none
HA: $y=0$



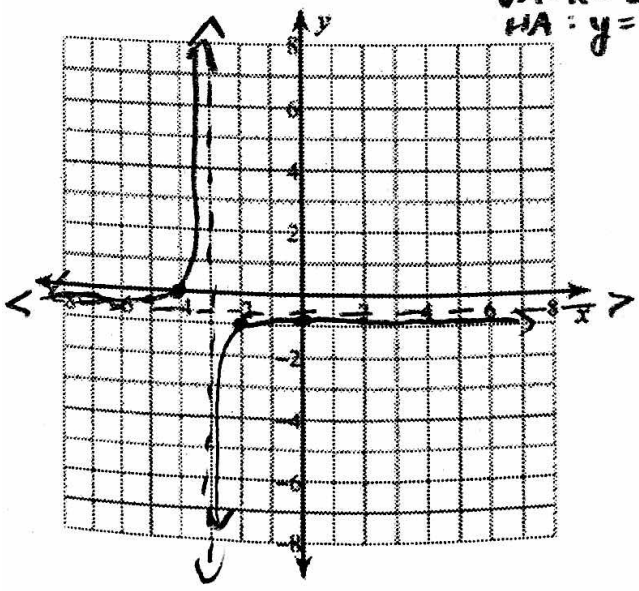
6. $f(x) = \frac{x-4}{-4x-16} = \frac{x-4}{-4(x+4)}$

Hole: none
VA: $x=-4$
x-int: (4,0)
HA: $y=-1/4$



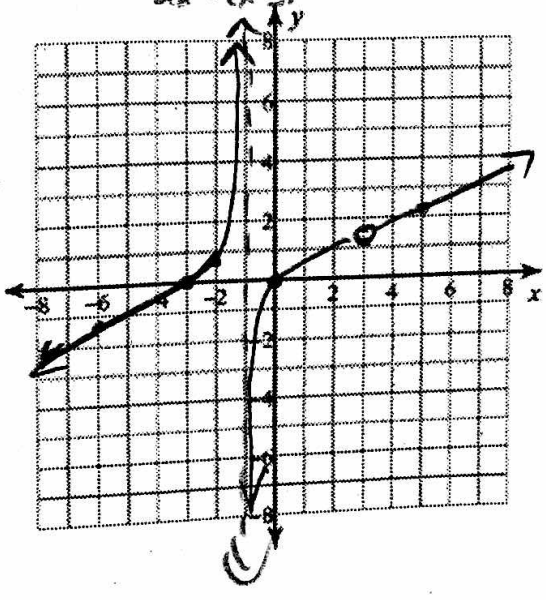
7. $f(x) = \frac{x+4}{-2x-6} = \frac{x+4}{-2(x+3)}$

Hole: none
x-int: (-4,0)
VA: $x=-3$
HA: $y=-1/2$



8. $f(x) = \frac{x^3-9x}{3x^2-6x-9} = \frac{x(x+3)(x-3)}{3(x-3)(x+1)}$
$3(x^2-2x-3)$

Hole: $x=3$
VA: $x=-1$
x-int: (-3,0) (0,0)
HA None



$y: \frac{3}{12} = \frac{1}{4}$