

# Graphing Rational Functions

PROBLEMS 1-4 ARE OPTIONAL, BE SURE TO DO PROBLEMS 5-14, THOUGH. Answers are below

**Identify the points of discontinuity, holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each.** If not HA's find all end-behavior asymptotes, as well.

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

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

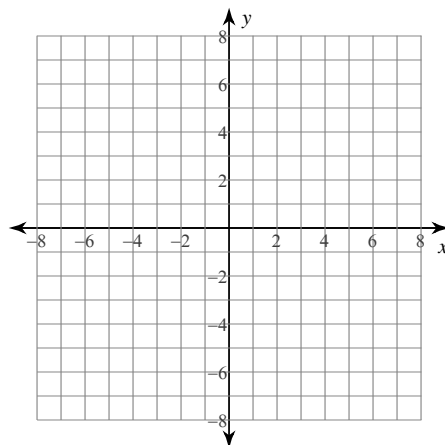
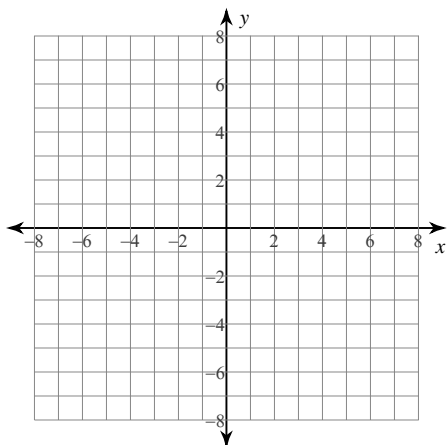
$$3) f(x) = \frac{x^3 - x^2 - 6x}{-3x^2 - 3x + 18}$$

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

**Identify the points of discontinuity, holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.** If not HA's find all end-behavior asymptotes, as well.

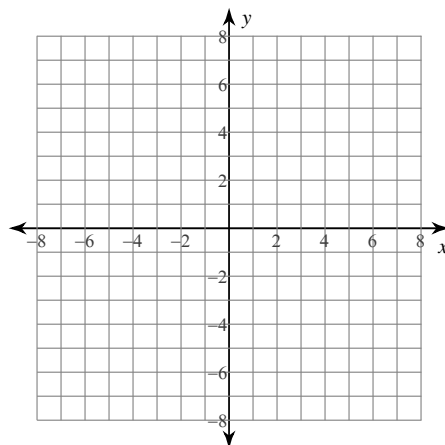
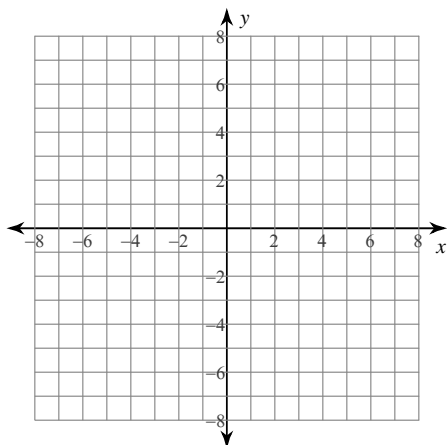
$$5) f(x) = -\frac{4}{x^2 - 3x}$$

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

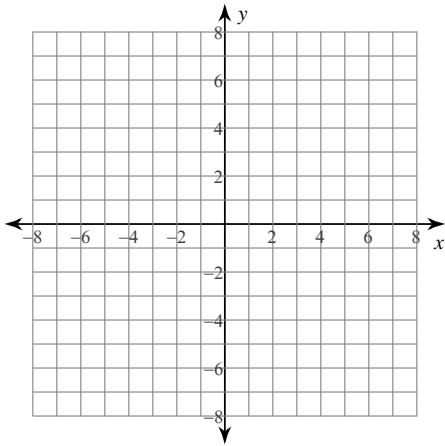


$$7) f(x) = \frac{x + 4}{-2x - 6}$$

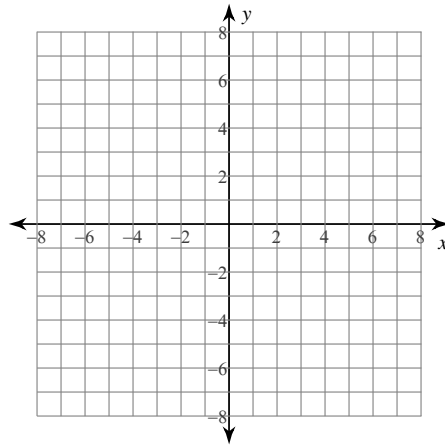
$$8) f(x) = \frac{x^3 - 9x}{3x^2 - 6x - 9}$$



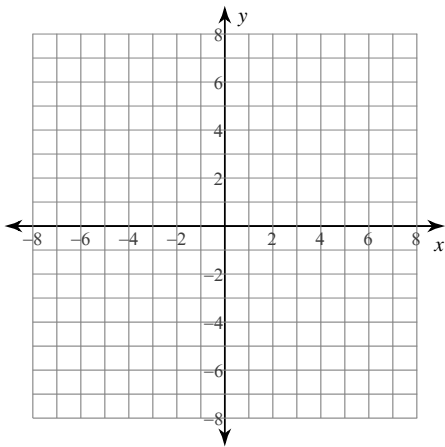
$$9) f(x) = \frac{3x^2 - 12x}{x^2 - 2x - 3}$$



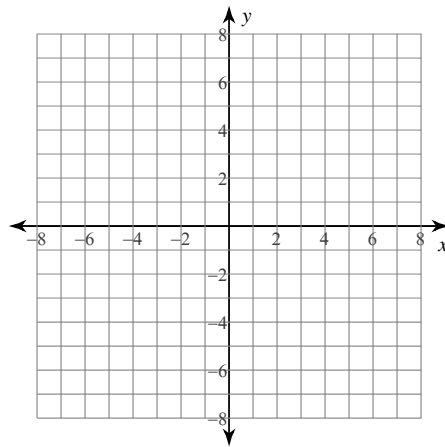
$$10) f(x) = \frac{x^3 - 16x}{-4x^2 + 4x + 24}$$



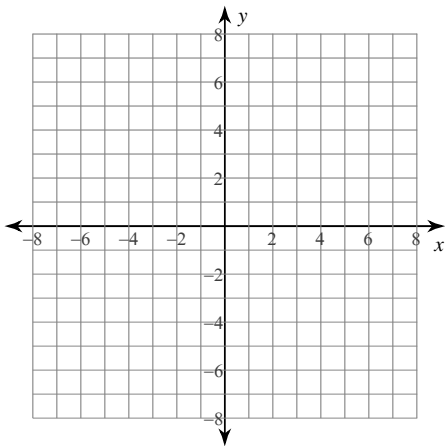
$$11) f(x) = \frac{x^2 + 2x}{-4x + 8}$$



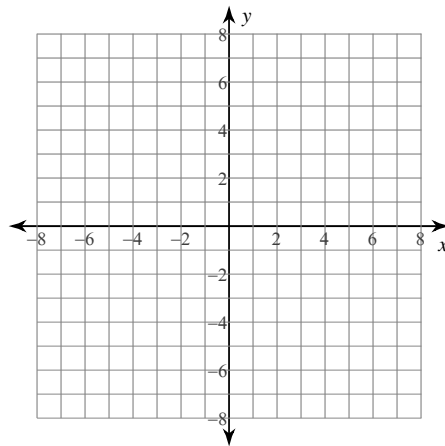
$$12) f(x) = \frac{x + 2}{2x + 6}$$



$$13) f(x) = \frac{2x^2 + 10x + 12}{x^2 + 3x + 2}$$



$$14) f(x) = \frac{3}{x - 2}$$



# Graphing Rational Functions

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

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

Discontinuities: -3, 2  
 Vertical Asym.:  $x = -3, x = 2$   
 Holes: None  
 Horz. Asym.:  $y = 0$   
 X-intercepts: None

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

Discontinuities: 4  
 Vertical Asym.:  $x = 4$   
 Holes: None  
 Horz. Asym.:  $y = 1$   
 X-intercepts: 2

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

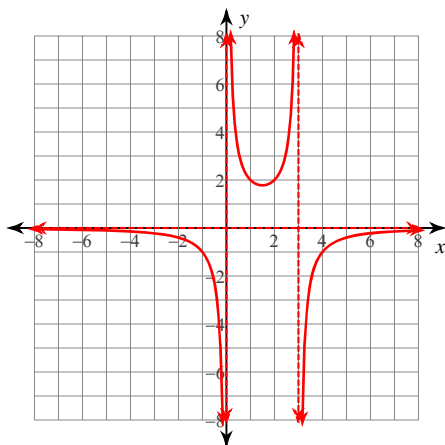
Discontinuities: 2, -3  
 Vertical Asym.:  $x = 2, x = -3$   
 Holes: None  
 Horz. Asym.: None  
 X-intercepts: 0, -2, 3

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

Discontinuities: -1, -3  
 Vertical Asym.:  $x = -1$   
 Holes:  $x = -3$   
 Horz. Asym.:  $y = -\frac{1}{4}$   
 X-intercepts: 2

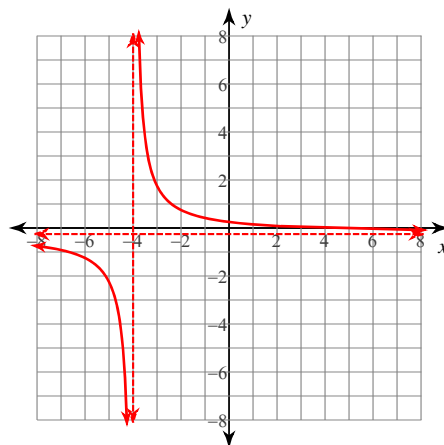
Identify the points of discontinuity, holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.

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



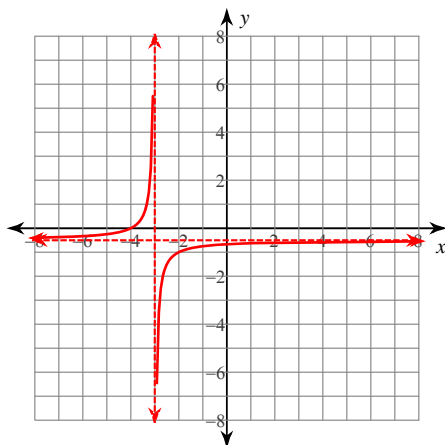
Discontinuities: 0, 3  
 Vertical Asym.:  $x = 0, x = 3$   
 Holes: None  
 Horz. Asym.:  $y = 0$

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



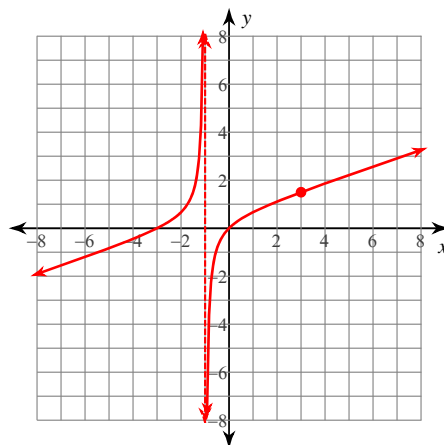
Discontinuities: -4  
 Vertical Asym.:  $x = -4$   
 Holes: None  
 Horz. Asym.:  $y = -\frac{1}{4}$

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



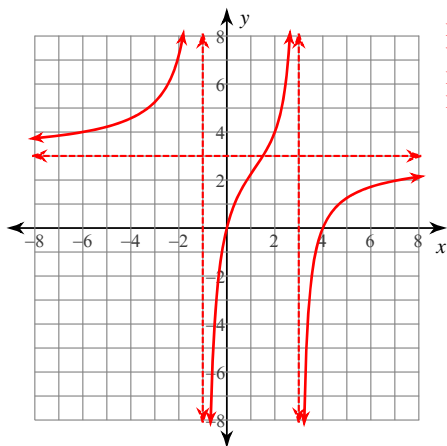
Discontinuities: -3  
 Vertical Asym.:  $x = -3$   
 Holes: None  
 Horz. Asym.:  $y = -\frac{1}{2}$

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



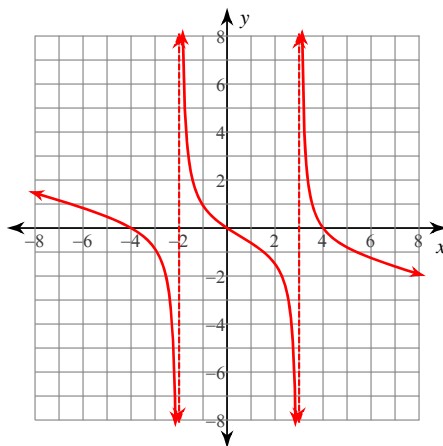
Discontinuities: -1, 3  
 Vertical Asym.:  $x = -1$   
 Holes:  $x = 3$   
 Horz. Asym.: None

$$9) f(x) = \frac{3x^2 - 12x}{x^2 - 2x - 3}$$



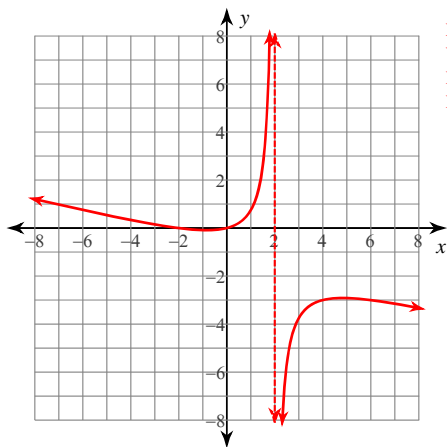
Discontinuities: -1, 3  
Vertical Asym.:  $x = -1, x = 3$   
Holes: None  
Horz. Asym.:  $y = 3$

$$10) f(x) = \frac{x^3 - 16x}{-4x^2 + 4x + 24}$$



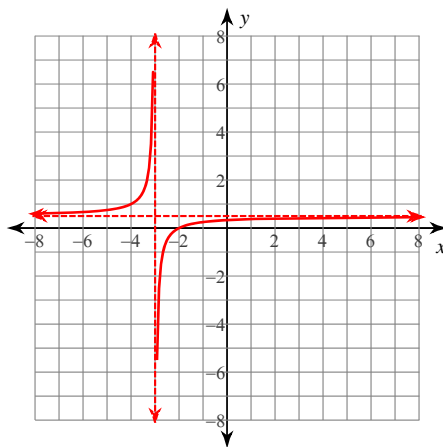
Discontinuities: 3, -2  
Vertical Asym.:  $x = 3, x = -2$   
Holes: None  
Horz. Asym.: None

$$11) f(x) = \frac{x^2 + 2x}{-4x + 8}$$



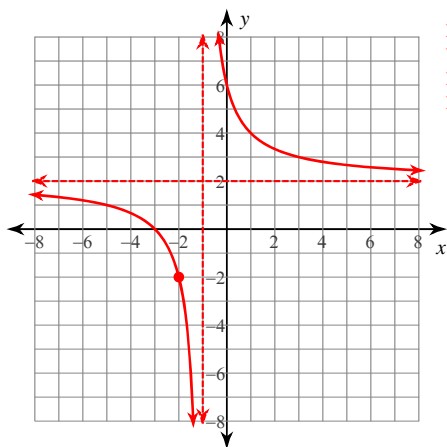
Discontinuities: 2  
Vertical Asym.:  $x = 2$   
Holes: None  
Horz. Asym.: None

$$12) f(x) = \frac{x + 2}{2x + 6}$$



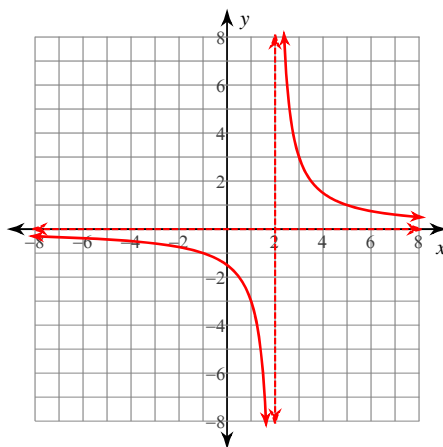
Discontinuities: -3  
Vertical Asym.:  $x = -3$   
Holes: None  
Horz. Asym.:  $y = \frac{1}{2}$

$$13) f(x) = \frac{2x^2 + 10x + 12}{x^2 + 3x + 2}$$



Discontinuities: -1, -2  
Vertical Asym.:  $x = -1$   
Holes:  $x = -2$   
Horz. Asym.:  $y = 2$

$$14) f(x) = \frac{3}{x - 2}$$



Discontinuities: 2  
Vertical Asym.:  $x = 2$   
Holes: None  
Horz. Asym.:  $y = 0$