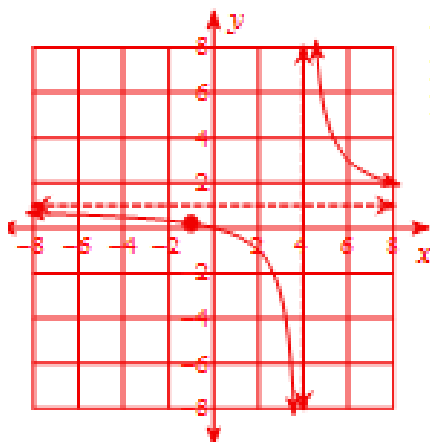


Thinking Rational

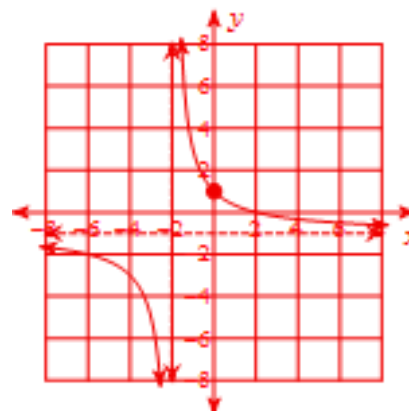
For #'s 1-10, graph the Rational Functions. First find all relevant information needed (intercepts, asymptotes, end behavior, and holes).

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

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



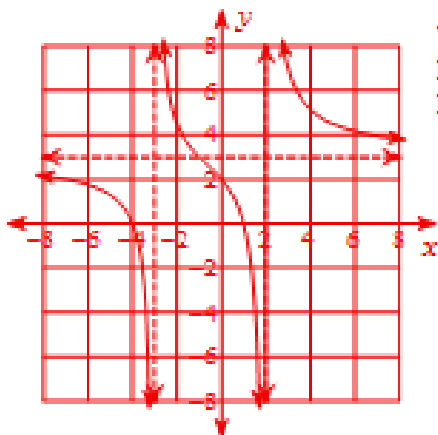
Vertical Asym: $x = 4$
 Holes: $x = -1$
 Horz. Asym: $y = 1$



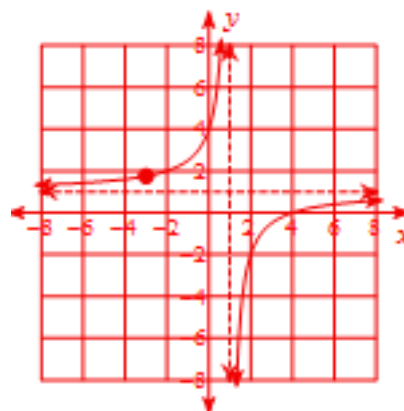
Vertical Asym: $x = -2$
 Holes: $x = 0$
 Horz. Asym: $y = -1$

$$3) f(x) = \frac{3x^2 + 9x - 12}{x^2 + x - 6}$$

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

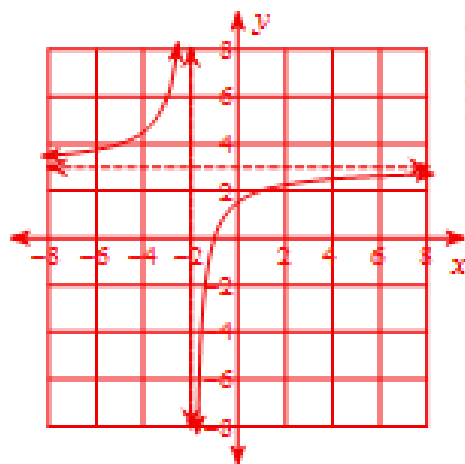


Vertical Asym: $x = 2, x = -3$
 Holes: None
 Horz. Asym: $y = 3$



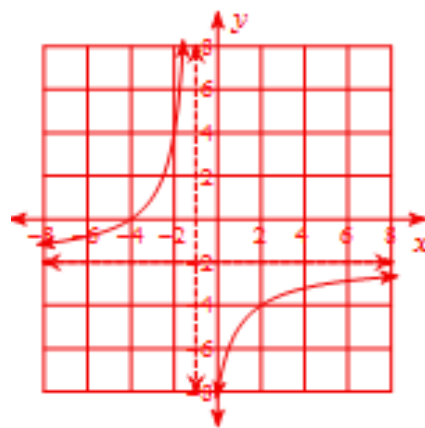
Vertical Asym: $x = 1$
 Holes: $x = -3$
 Horz. Asym: $y = 1$

$$5) f(x) = \frac{3x+3}{x+2}$$



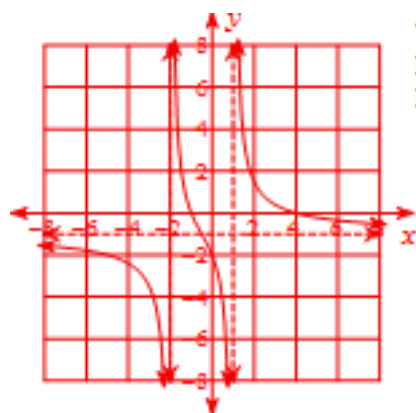
Vertical Asym: $x = -2$
 Holes: None
 Horz. Asym: $y = 3$

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



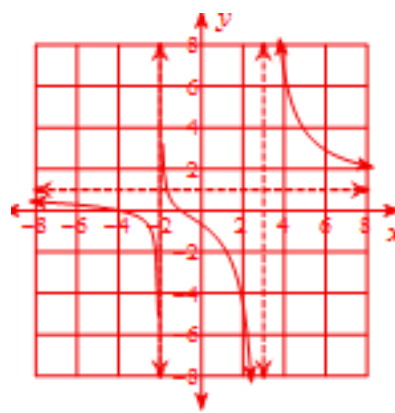
Vertical Asym: $x = -1$
 Holes: None
 Horz. Asym: $y = -2$

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



Vertical Asym: $x = 1, x = -2$
 Holes: None
 Horz. Asym: $y = -1$

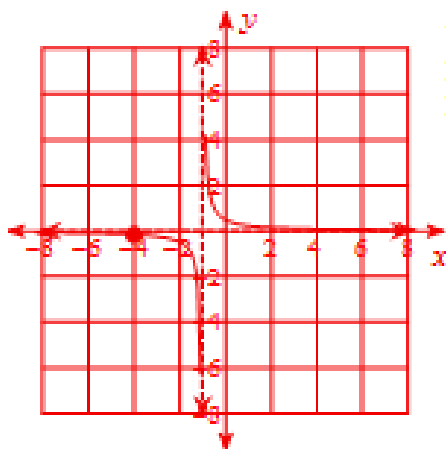
$$8) f(x) = \frac{x^2+5x+4}{x^2-x-6}$$



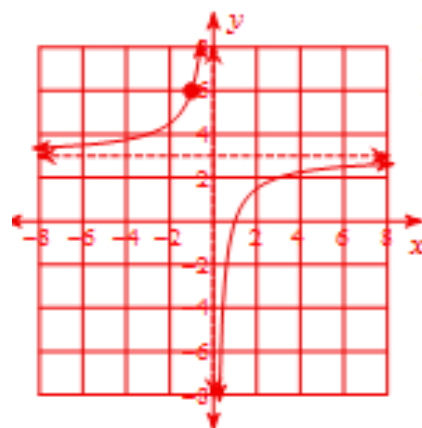
Vertical Asym: $x = 3, x = -2$
 Holes: None
 Horz. Asym: $y = 1$

$$9) f(x) = \frac{x+4}{2x^2+10x+8}$$

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



Vertical Asym: $x = -1$
 Holes: $x = -4$
 Horz. Asym: $y = 0$



Vertical Asym: $x = 0$
 Holes: $x = -1$
 Horz. Asym: $y = 3$

Bonus:

Find the slant asymptote and sketch a graph (no horizontal asymptote).

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

