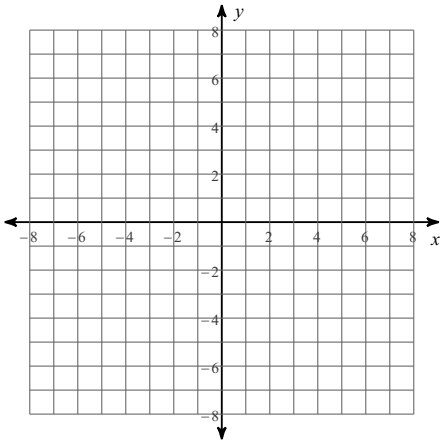
Precalculus Name_____

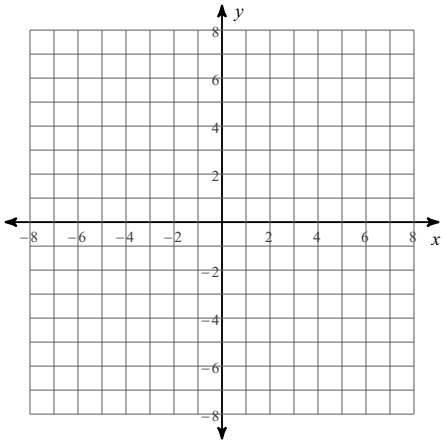
Rational Functions: Holes and Asymptotes

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

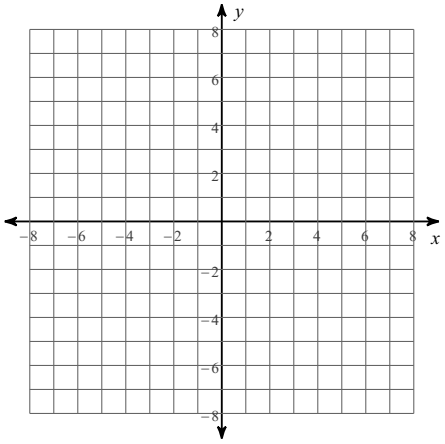
1) $f(x) = \dfrac{x + 1}{x - 2}$



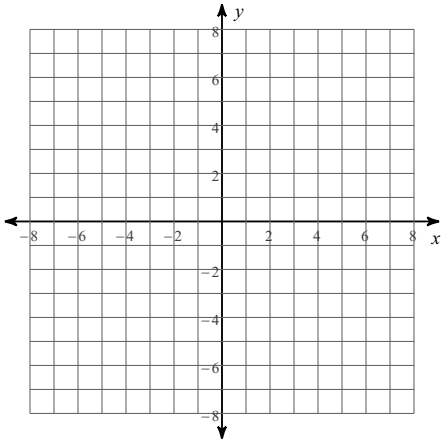
2) $f(x) = \dfrac{x^2 + 2x - 8}{-x^2 + 6x - 8}$



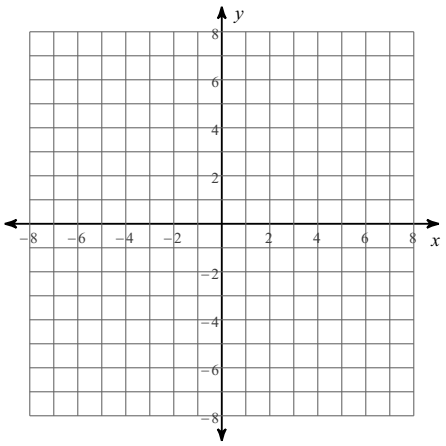
3) $f(x) = \dfrac{x^2 - 7x + 12}{-2x^2 - 2x + 24}$



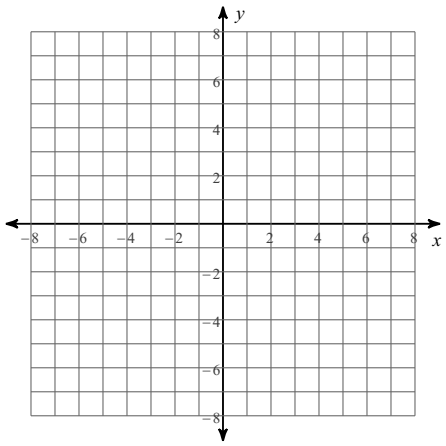
4) $f(x) = \dfrac{3x^2 - 3x - 18}{x^2 - 4}$



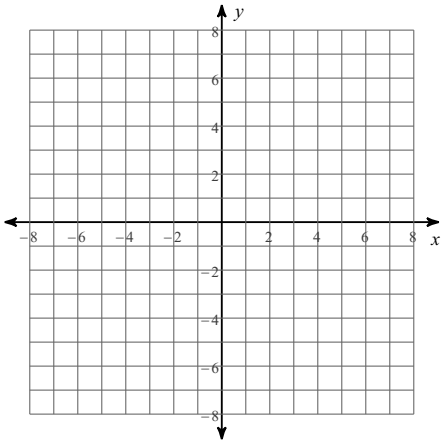
5) $f(x) = \dfrac{x^2 + 6x + 8}{x^2 + 3x - 4}$



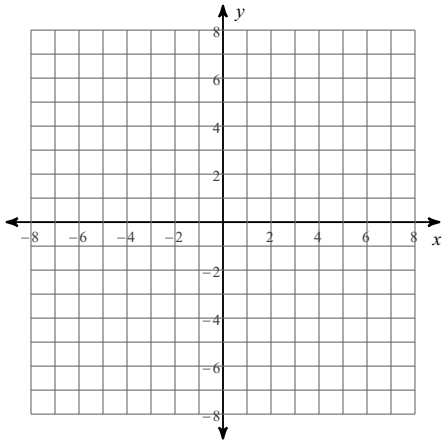
6) $f(x) = \dfrac{2x + 6}{x^2 + 5x + 6}$



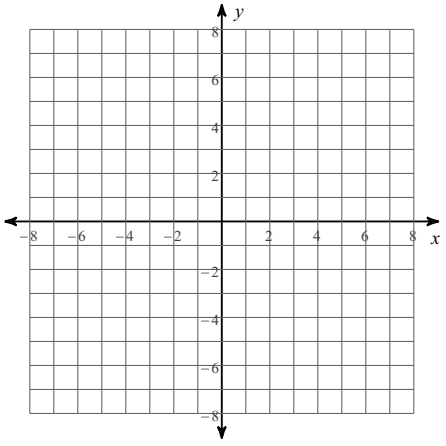
7) $f(x) = \dfrac{-2x - 6}{x}$



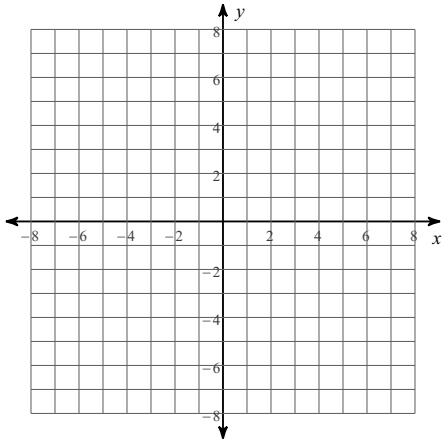
8) $f(x) = \dfrac{-3x + 12}{x - 2}$



9) $f(x) = -\dfrac{3}{x}$

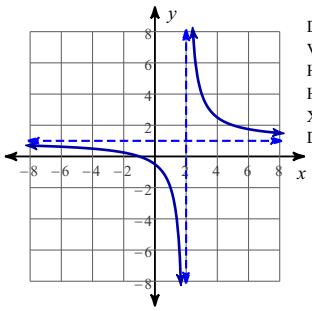


10) $f(x) = \dfrac{x^3 + x^2 - 12x}{x^3 - x^2 - 6x}$



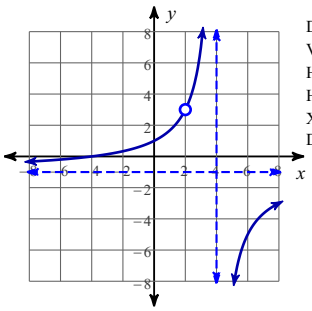
Answers to Rational Functions: Holes and Asymptotes

1)



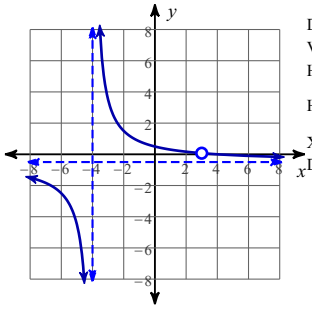
Discontinuities: 2
Vertical Asym.: $x = 2$
Holes: None
Horz. Asym.: $y = 1$
X-intercepts: -1
Domain:
All reals except 2

2)



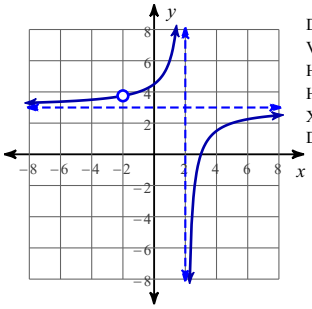
Discontinuities: 4, 2
Vertical Asym.: $x = 4$
Holes: $x = 2$
Horz. Asym.: $y = -1$
X-intercepts: -4
Domain:
All reals except 4, 2

3)



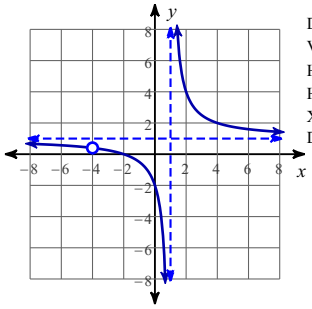
Discontinuities: -4, 3
Vertical Asym.: $x = -4$
Holes: $x = 3$
Horz. Asym.: $y = -\frac{1}{2}$
X-intercepts: 4
Domain:
All reals except -4, 3

4)



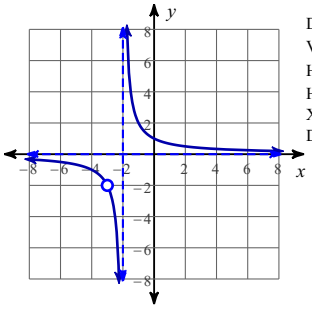
Discontinuities: 2, -2
Vertical Asym.: $x = 2$
Holes: $x = -2$
Horz. Asym.: $y = 3$
X-intercepts: 3
Domain:
All reals except 2, -2

5)



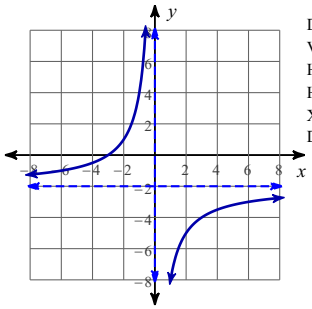
Discontinuities: 1, -4
Vertical Asym.: $x = 1$
Holes: $x = -4$
Horz. Asym.: $y = 1$
X-intercepts: -2
Domain:
All reals except 1, -4

6)



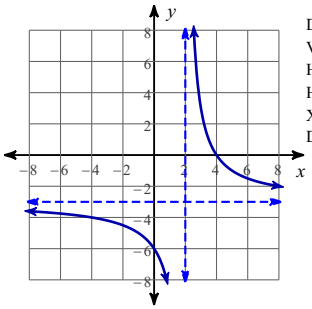
Discontinuities: -2, -3
Vertical Asym.: $x = -2$
Holes: $x = -3$
Horz. Asym.: $y = 0$
X-intercepts: None
Domain:
All reals except -2, -3

7)



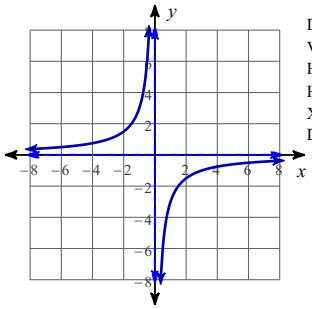
Discontinuities: 0
Vertical Asym.: $x = 0$
Holes: None
Horz. Asym.: $y = -2$
X-intercepts: -3
Domain:
All reals except 0

8)



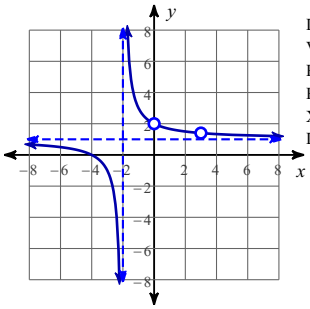
Discontinuities: 2
Vertical Asym.: $x = 2$
Holes: None
Horz. Asym.: $y = -3$
X-intercepts: 4
Domain:
All reals except 2

9)



Discontinuities: 0
Vertical Asym.: $x = 0$
Holes: None
Horz. Asym.: $y = 0$
X-intercepts: None
Domain:
All reals except 0

10)



Discontinuities: -2, 0, 3
Vertical Asym.: $x = -2$
Holes: $x = 0$, $x = 3$
Horz. Asym.: $y = 1$
X-intercepts: -4
Domain:
All reals except -2, 0, 3