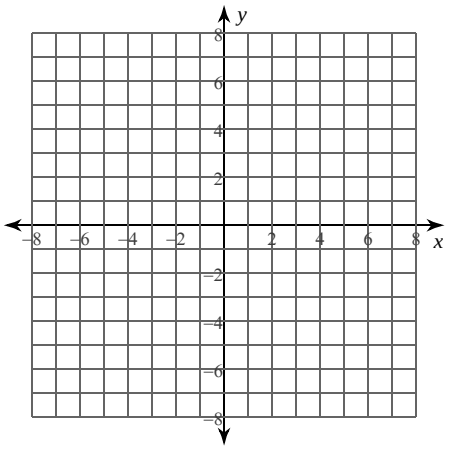
 Name_____

Graphs of Rational Functions

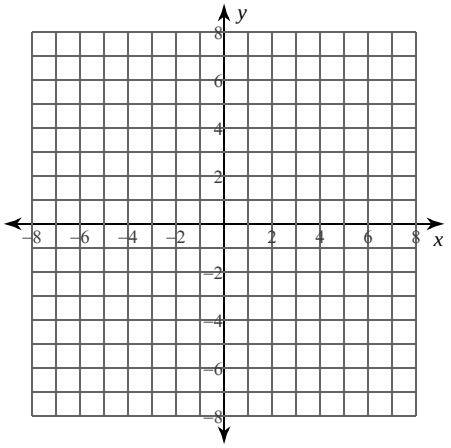
Date_____ Period____

For each function, identify the points of discontinuity, holes, intercepts, horizontal asymptote, domain, limit behavior at all vertical asymptotes, and end behavior asymptote. Then sketch the graph.

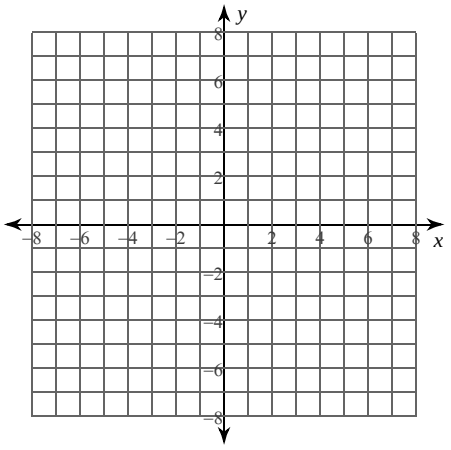
1) $f(x) = \frac{1}{x-3} + 3$



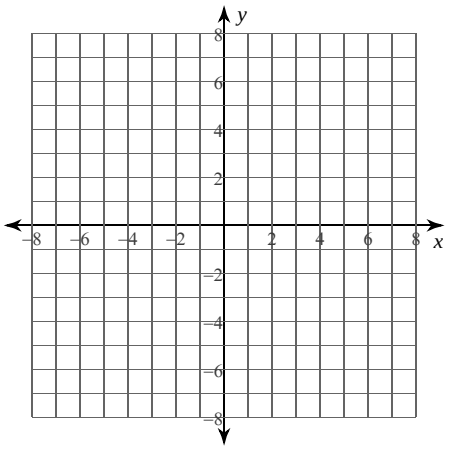
2) $f(x) = -\frac{3}{x-2} - 2$



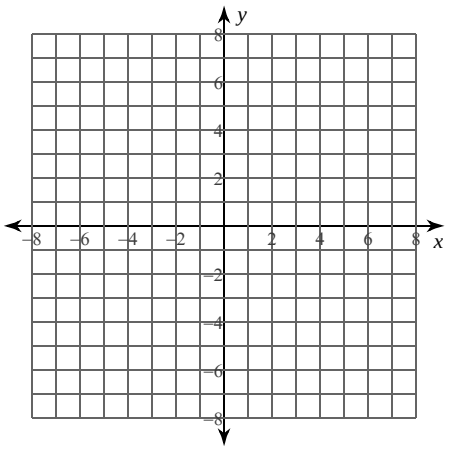
3) $f(x) = \frac{x^2-4}{x^2-9}$



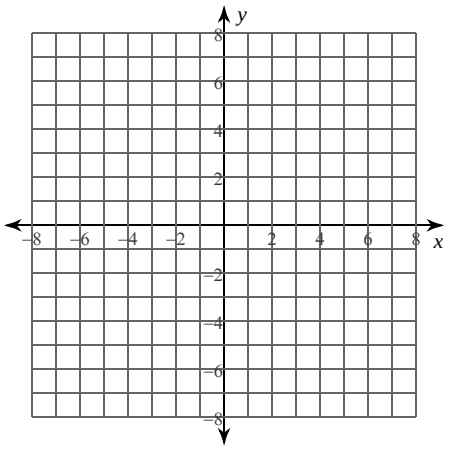
4) $f(x) = \dfrac{2x^2 - 12x + 16}{x^2 - x - 12}$



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



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



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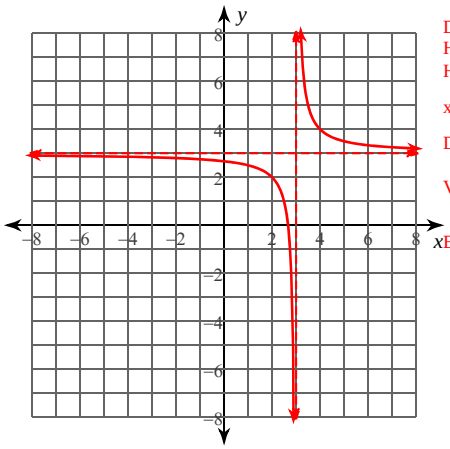
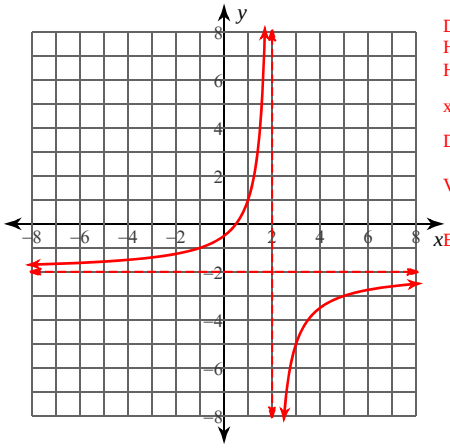


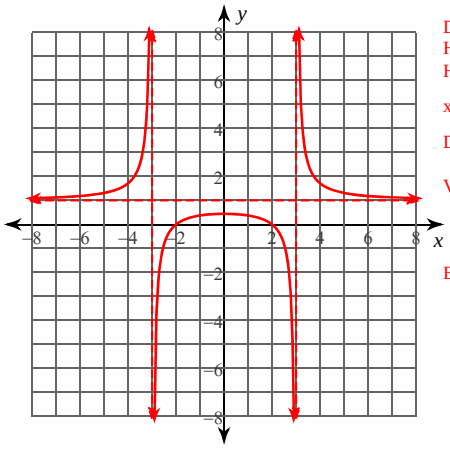
Discontinuities: 3
Holes: None
Horz. Asym.: $y = 3$
x-intercepts: $\frac{8}{3}$, y-intercept: $\frac{8}{3}$
Domain:
All reals except 3
Vert. Asym. behavior:
$\lim_{x\to 3^-} f(x) = -\infty$, $\lim_{x\to 3^+} f(x) = \infty$
End behavior asym.: $y = 3$

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



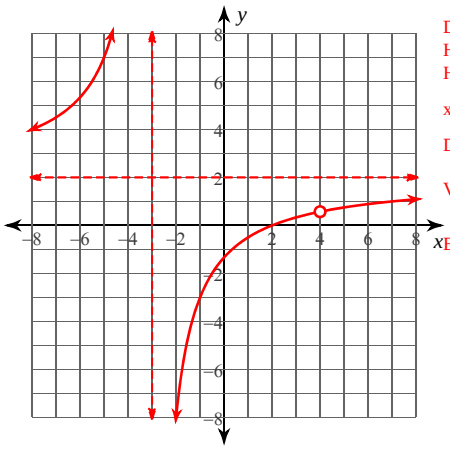
Discontinuities: 2
Holes: None
Horz. Asym.: $y = -2$
x-intercepts: $\frac{1}{2}$, y-intercept: $-\frac{1}{2}$
Domain:
All reals except 2
Vert. Asym. behavior:
$\lim_{x\to 2^-} f(x) = \infty$, $\lim_{x\to 2^+} f(x) = -\infty$
End behavior asym.: $y = -2$

3) $f(x) = \dfrac{x^2-4}{x^2-9}$



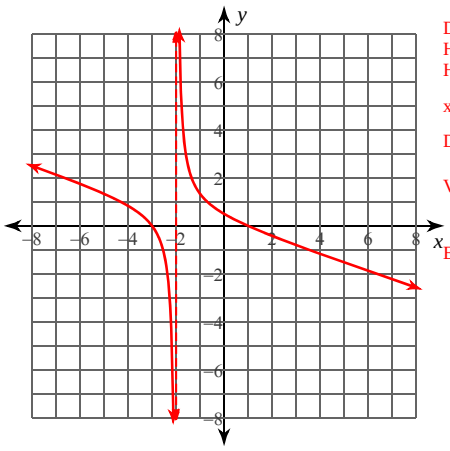
Discontinuities: 3, −3
Holes: None
Horz. Asym.: $y = 1$
x-intercepts: 2, −2, y-intercept: $\frac{4}{9}$
Domain:
All reals except −3, 3
Vert. Asym. behavior:
$\lim_{x\to -3^-} f(x) = \infty$, $\lim_{x\to -3^+} f(x) = -\infty$
$\lim_{x\to 3^-} f(x) = -\infty$, $\lim_{x\to 3^+} f(x) = \infty$
End behavior asym.: $y = 1$

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



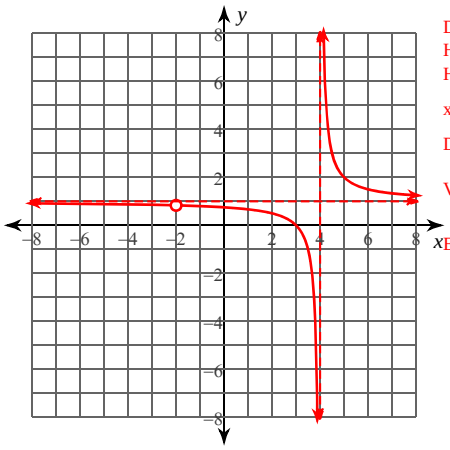
Discontinuities: −3, 4
Holes: $x = 4$
Horz. Asym.: $y = 2$
x-intercepts: 2, y-intercept: $-\frac{4}{3}$
Domain:
All reals except −3, 4
Vert. Asym. behavior:
$\lim_{x \to -3^-} f(x) = \infty$, $\lim_{x \to -3^+} f(x) = -\infty$
End behavior asym.: $y = 2$

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



Discontinuities: −2
Holes: None
Horz. Asym.: None
x-intercepts: 1, −3, y-intercept: $\frac{1}{2}$
Domain:
All reals except −2
Vert. Asym. behavior:
$\lim_{x \to -2^-} f(x) = -\infty$, $\lim_{x \to -2^+} f(x) = \infty$
End behavior asym.: $y = -\frac{x}{3}$

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



Discontinuities: 4, −2
Holes: $x = -2$
Horz. Asym.: $y = 1$
x-intercepts: 3, y-intercept: $\frac{3}{4}$
Domain:
All reals except 4, −2
Vert. Asym. behavior:
$\lim_{x \to 4^-} f(x) = -\infty$, $\lim_{x \to 4^+} f(x) = \infty$
End behavior asym.: $y = 1$

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