

5.3.D3 ~ Writing Rational Functions

Write the rational function in its factored form. Then analyze each rational function for its long-run behavior (end behavior and horizontal asymptote) and its short-run behavior (intercepts, vertical asymptote, and holes). Write DNE if the function doesn't have a particular property. Then match the function to its graph (below).

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

Graph: _____

$\lim_{x \rightarrow -\infty} f(x) =$	$\lim_{x \rightarrow \infty} f(x) =$	Horizontal asymptote: $y =$	y-intercept:
Vertical asymptote: $x =$	x-intercept:	Hole:	Domain: $x \neq$

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

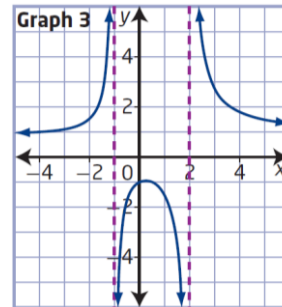
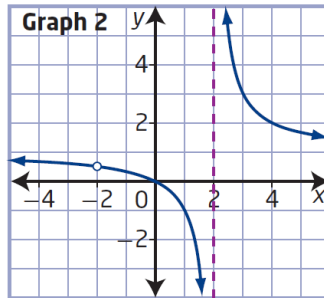
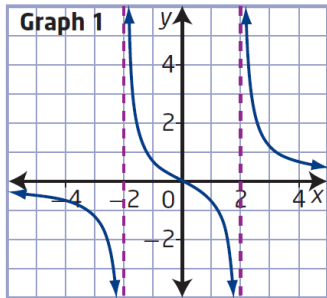
Graph: _____

$\lim_{x \rightarrow -\infty} f(x) =$	$\lim_{x \rightarrow \infty} f(x) =$	Horizontal asymptote: $y =$	y-intercept:
Vertical asymptote: $x =$	x-intercept:	Hole:	Domain: $x \neq$

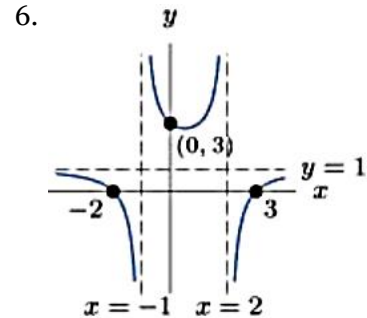
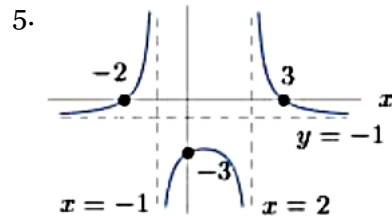
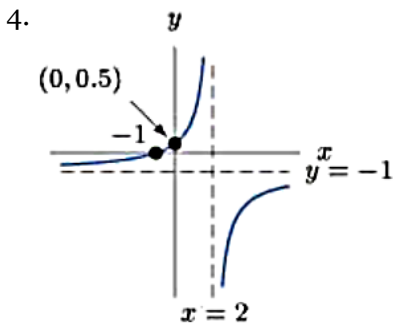
3. $f(x) = \frac{x^2 + 2}{x^2 - x - 2}$

Graph: _____

$\lim_{x \rightarrow -\infty} f(x) =$	$\lim_{x \rightarrow \infty} f(x) =$	Horizontal asymptote: $y =$	y-intercept:
Vertical asymptote: $x =$	x-intercept:	Hole:	Domain: $x \neq$



Find a possible formula for the rational function graphed or described.



7. Determine which rational function has a graph that crosses the x -axis at -1 , touches the x -axis at -4 , has vertical asymptotes at $x = -2$ & $x = 3$, and has a horizontal asymptote at $y = -2$.

$$A(x) = \frac{-(x+1)(x+4)^2}{2(x-2)^2(x+3)} \quad B(x) = \frac{-2(x+1)(x+4)^2}{(x+2)^2(x-3)} \quad C(x) = \frac{-2(x-3)(x+2)^2}{(x+4)^2(x+1)} \quad D(x) = \frac{-2(x+1)(x+4)}{(x+2)(x-3)}$$

8. The function has x -intercepts at $x = -3$ & $x = 2$. It has vertical asymptotes at $x = -5$ & $x = 7$ and a horizontal asymptote at $y = -1$.
9. The function has x -intercepts at $x = 8$ & $x = 1$. It has a vertical asymptote at $x = 5$ and a horizontal asymptote at $y = -3$.
10. The function has a vertical asymptote at $x = -1$ and a horizontal asymptote at $y = 1$. The graph intersects the y -axis at $y = 3$ & crosses the x -axis once at $x = -3$.
11. The function has a horizontal asymptote at $y = 0$ and two vertical asymptotes at $x = -4$ & $x = 9$. The graph crosses the x -axis once at $x = 3$.
12. The function has a horizontal asymptote at $y = 1$ and two vertical asymptotes at $x = -3$ & $x = 4$. The graph touches the x -axis once at $x = 10$.
13. The function has an x -intercept at $x = 1$, a vertical asymptote at $x = -5$, a hole at $x = -2$, and a horizontal asymptote at $y = 2$.
14. The function has a vertical asymptote at $x = 3$, a horizontal asymptote at $y = 0$, a y -intercept of $(0, -1)$, and no x -intercept.
15. The function has no horizontal asymptote; one vertical asymptote at $x = -5$, & it touches the x -axis at $(0, 0)$.