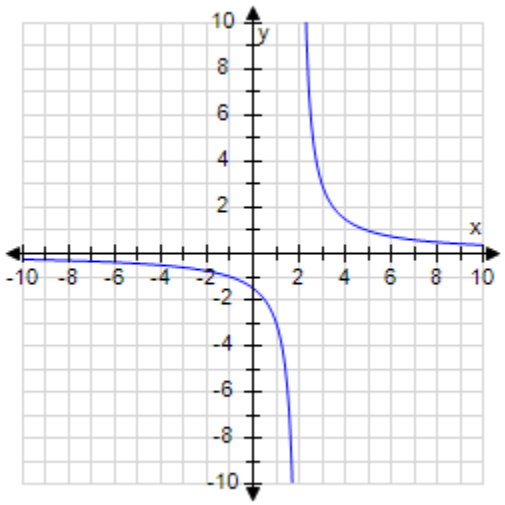
1. Determine the equations of the vertical and horizontal asymptotes of the graph of the function $f(x) = \frac{1}{x-3}$.

a. horizontal: $y = 1$; vertical: $x = 3$
b. horizontal: $x = 0$; vertical: $y = 3$
c. horizontal: $y = -3$; vertical: $x = 0$
d. horizontal: $x = 3$; vertical: $y = -1$
e. horizontal: $y = 0$; vertical: $x = 3$

5. The graph of the function

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

is shown below. Determine the vertical and horizontal asymptotes of its graph.



a. horizontal: $y = 0$; vertical: $x = 2$
b. horizontal: $y = 0$; vertical: $x = -2$
c. horizontal: $y = -2$; vertical: $x = 0$
d. horizontal: $y = 2$; vertical: $x = 0$
e. horizontal: $y = -2$; vertical: $x = 2$

10. Find the domain of the function and identify any vertical and horizontal asymptotes.

$$f(x)=\frac{x^3}{x^2-49}$$

a. Domain: all real numbers x except $x = 0$
Vertical asymptotes: $x = 7$ and $x = –7$
Horizontal asymptote: No horizontal asymptote

b. Domain: all real numbers x except $x = \pm 7$
Vertical asymptotes: $x = 7$ and $x = –7$
Horizontal asymptote: No horizontal asymptote

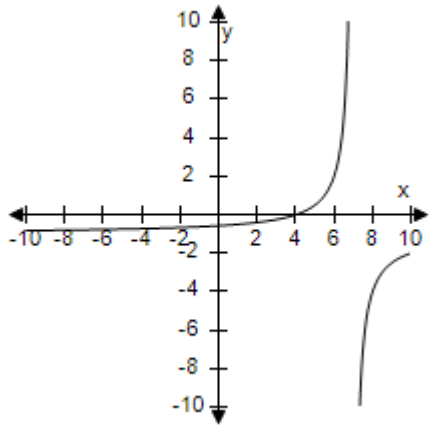
c. Domain: all real numbers x except $x = 7$
Vertical asymptote: $x = 7$
Horizontal asymptote: $y = 7$

d. Domain: all real numbers x
Vertical asymptote: $x = –7$
Horizontal asymptote: $y = 0$

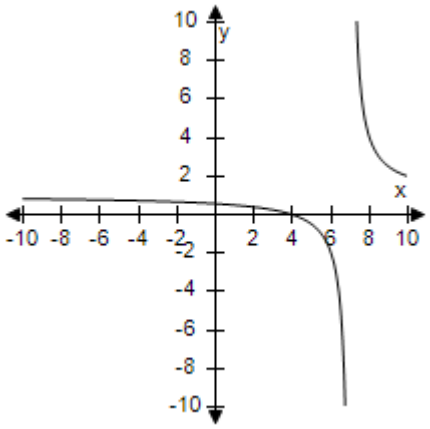
e. Domain: all real numbers x except $x = 0$
Vertical asymptote: $x = 0$
Horizontal asymptote: $y = –49$

18. Select the correct graph of the function $f(x)=\frac{x-4}{x-7}$.

a.

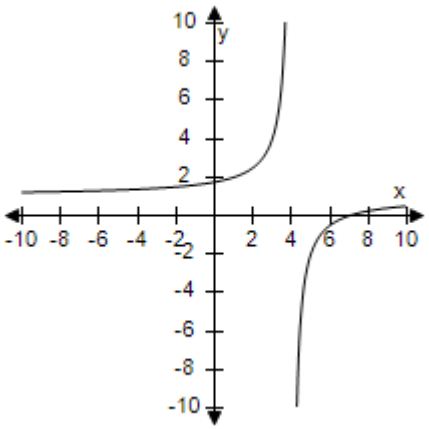


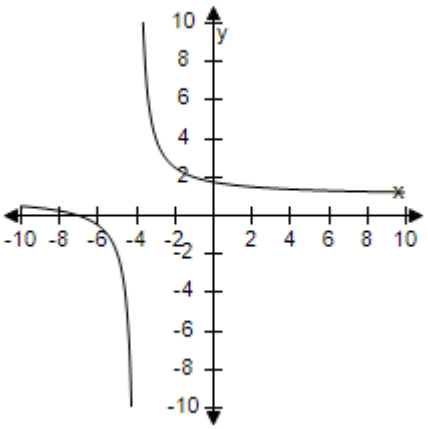
b.



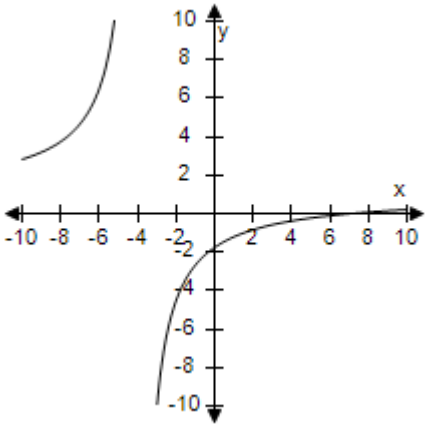
c.

d.





e.



23. Determine the zeros (if any) of the rational function $g(x) = 7 + \frac{4}{x^2 + 7}$.

a. $x = -7, x = 7$
b. $x = -\sqrt{7}, x = \sqrt{7}$
c. $x = -\frac{4}{7}, x = \frac{4}{7}$
d. $x = -4$
e. no zeros

38. Determine the equations of any horizontal and vertical asymptotes of $f(x) = \frac{x - 7}{x^2 - 49}$.

a. horizontal: $y = 0$; vertical: $x = -7$
b. horizontal: $y = -7$; vertical: $x =$

0

c. horizontal: $y = 7$; vertical: $x = -7$

d. horizontal: $y = 0$; vertical: $x = 7$

e. horizontal: $y = 0$; vertical: none

52. Find all intercepts of the following function.

$$f(t) = \frac{1 - 8t}{t}$$

a. $\left(-\frac{1}{8}, 0\right)$

b. (0, 8)

c. (8, 0)

d. $\left(\frac{1}{8}, 0\right)$

e. $\left(0, \frac{1}{8}\right)$

70. Given $f(x)=\frac{x^2-9}{x+3}, g(x)=x-3$, complete the table and explain how the two functions differ.

x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$							
$g(x)$							

x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$	–8	–7.5	Undefined	–6.5	–6	–5.5	–5
$g(x)$	–8	–7.5	–7	–6.5	–6	–5.5	–5

a.

x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$	–8	–7.5	Undefined	–6.5	–6	–5.5	–5
$g(x)$	–8	–7.5	–7	–6.5	–6	–5.5	–5

The graph of $f(x) = g(x)$ except when $x = –4$. Because the factor $x + 3$ canceled, there is a hole in the graph of $f(x)$ when $x = –4$.

b.

x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$	–8	Undefined	–7	–6.5	–6	–5.5	–5
$g(x)$	–8	–7.5	–7	–6.5	–6	–5.5	–5

The graph of $f(x) = g(x)$ except when $x = –4.5$. Because the factor $x + 3$ canceled, there is a hole in the graph of $f(x)$ when $x = –4.5$.

c.

x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$	–8	–7.5	–7	Undefined	–6	–5.5	–5

$g(x)$	–8	–7.5	–7	–6.5	–6	–5.5	–5

The graph of $f(x) = g(x)$ except when $x = –3.5$. Because the factor $x + 3$ canceled, there is a hole in the graph of $f(x)$ when $x = –3.5$.

d.

x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$	–8	–7.5	–7	–6.5	Undefined	–5.5	–5
$g(x)$	–8	–7.5	–7	–6.5	–6	–5.5	–5

The graph of $f(x) = g(x)$ except when $x = –3$. Because the factor $x + 3$ canceled, there is a hole in the graph of $f(x)$ when $x = –3$.

e.

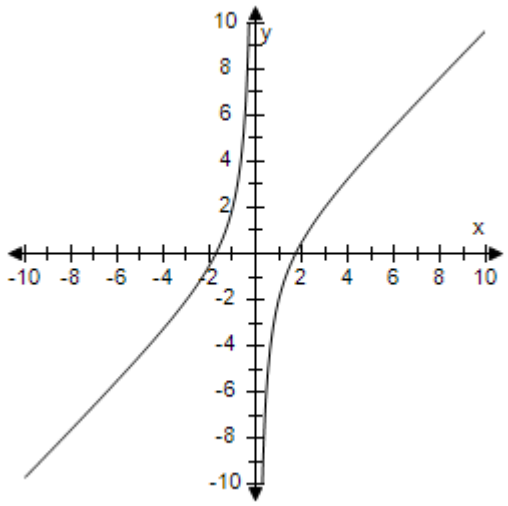
x	–5	–4.5	–4	–3.5	–3	–2.5	–2
$f(x)$	–8	–7.5	–7	–6.5	–6	Undefined	–5
$g(x)$	–8	–7.5	–7	–6.5	–6	–5.5	–5

The graph of $f(x) = g(x)$ except when $x = –2.5$. Because the factor $x + 3$ canceled, there is a hole in the graph $f(x)$ when $x = –2.5$.

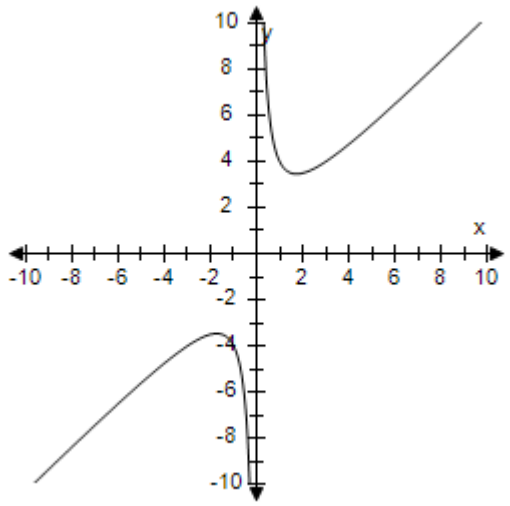
81. Select the correct graph of the following function.

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

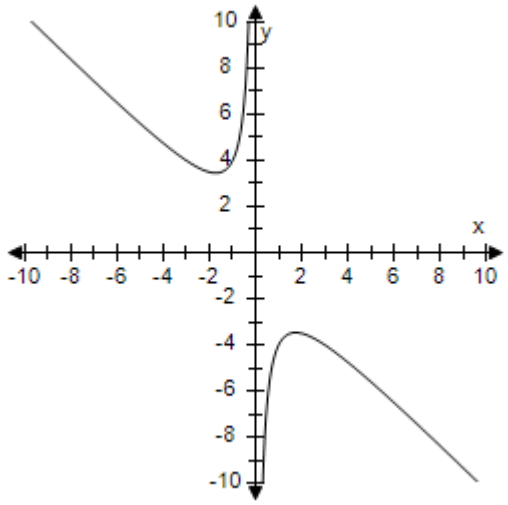
a.



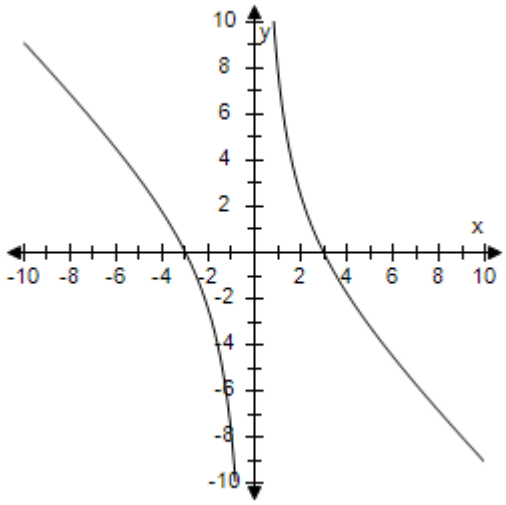
b.



c.



d.



e.