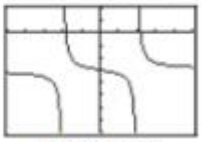
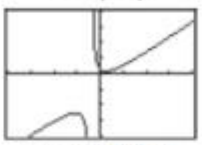
28. Intercepts: $(0, -3)$, $(-1.84, 0)$, and $(2.17, 0)$. Asymptotes: $x = -2$, $x = 2$, and $y = -3$.



$[-5, 5]$ by $[-8, 2]$

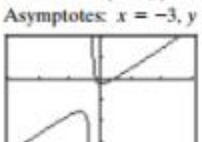
29. Intercept: $\left(0, \frac{3}{2}\right)$. Asymptotes: $x = -2$, $y = x - 4$.



$[-20, 20]$ by $[-20, 20]$

30. Intercepts: $\left(0, -\frac{7}{3}\right)$, $(-1.54, 0)$, and $(4.54, 0)$.

Asymptotes: $x = -3$, $y = x - 6$.



$[-30, 30]$ by $[-40, 20]$

31. (d); Xmin = −2, Xmax = 8, Xscl = 1, and Ymin = −3, Ymax = 3, Yscl = 1.

32. (b); Xmin = −6, Xmax = 2, Xscl = 1, and Ymin = −3, Ymax = 3, Yscl = 1.

33. (a); Xmin = −3, Xmax = 5, Xscl = 1, and Ymin = −5, Ymax = 10, Yscl = 1.

34. (f); Xmin = −6, Xmax = 2, Xscl = 1, and Ymin = −5, Ymax = 5, Yscl = 1.

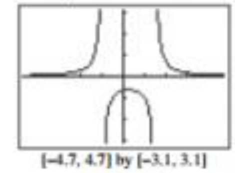
35. (e); Xmin = −2, Xmax = 8, Xscl = 1, and Ymin = −3, Ymax = 3, Yscl = 1.

36. (c); Xmin = −3, Xmax = 5, Xscl = 1, and Ymin = −3, Ymax = 8, Yscl = 1.

37. For $f(x) = 2/(2x^2 - x - 3)$, the numerator is never zero, and so $f(x)$ never equals zero and the graph has no x-intercepts. Because $f(0) = -2/3$, the y-intercept is $-2/3$. The denominator factors as $2x^2 - x - 3 = (2x - 3)(x + 1)$, so there are vertical asymptotes at $x = -1$ and $x = 3/2$. And because the degree of the numerator is less than the degree of the denominator, the horizontal asymptote is $y = 0$. The graph supports this information and allows us to conclude that

$\lim_{x \to -1^-} f(x) = \infty$, $\lim_{x \to -1^+} f(x) = -\infty$, $\lim_{x \to (3/2)^-} f(x) = -\infty$, and $\lim_{x \to (3/2)^+} f(x) = \infty$.

The graph also shows a local maximum of $-16/25$ at $x = 1/4$.



$[-4.7, 4.7]$ by $[-3.1, 3.1]$

Intercept: $\left(0, -\frac{2}{3}\right)$

Domain: $(-\infty, -1) \cup \left(-1, \frac{3}{2}\right) \cup \left(\frac{3}{2}, \infty\right)$

Range: $\left(-\infty, -\frac{16}{25}\right] \cup (0, \infty)$

Continuity: All $x \neq -1, \frac{3}{2}$

Increasing on $(-\infty, -1)$ and $\left(-1, \frac{1}{4}\right]$

Decreasing on $\left[\frac{1}{4}, \frac{3}{2}\right)$ and $\left(\frac{3}{2}, \infty\right)$

Not symmetric

Unbounded

Local maximum at $\left(\frac{1}{4}, -\frac{16}{25}\right)$

Horizontal asymptote: $y = 0$

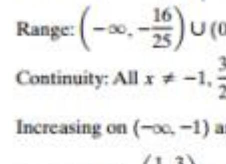
Vertical asymptotes: $x = -1$ and $x = 3/2$

End behavior: $\lim_{x \to -\infty} f(x) = \lim_{x \to \infty} f(x) = 0$

38. For $g(x) = 2/(x^2 + 4x + 3)$, the numerator is never zero, and so $g(x)$ never equals zero and the graph has no x-intercepts. Because $g(0) = 2/3$, the y-intercept is $2/3$. The denominator factors as $x^2 + 4x + 3 = (x + 1)(x + 3)$, so there are vertical asymptotes at $x = -3$ and $x = -1$. And because the degree of the numerator is less than the degree of the denominator, the horizontal asymptote is $y = 0$. The graph supports this information and allows us to conclude that

$\lim_{x \to -3^-} g(x) = \infty$, $\lim_{x \to -3^+} g(x) = -\infty$, $\lim_{x \to -1^-} g(x) = -\infty$, and $\lim_{x \to -1^+} g(x) = \infty$.

The graph also shows a local maximum of -2 at $x = -2$.



$[-6.7, 2.7]$ by $[-5, 5]$

Intercept: $\left(0, \frac{2}{3}\right)$

Domain: $(-\infty, -3) \cup (-3, -1) \cup (-1, \infty)$

Range: $(-\infty, -2] \cup (0, \infty)$

Continuity: All $x \neq -3, -1$

Increasing on $(-\infty, -3)$ and $(-3, -2]$

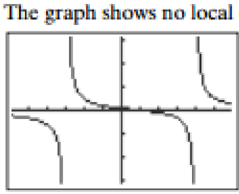
Decreasing on $[-2, -1)$ and $(-1, \infty)$

Symmetric about $x = -2$.

Unbounded

Local maximum at $(-2, -2)$
Horizontal asymptote: $y = 0$
Vertical asymptotes: $x = -3$ and $x = -1$
End behavior: $\lim_{x\to-\infty} g(x) = \lim_{x\to\infty} g(x) = 0$

39. For $h(x) = (x - 1)/(x^2 - x - 12)$, the numerator is zero when $x = 1$, so the x-intercept of the graph is 1. Because $h(0) = 1/12$, the y-intercept is $1/12$.
The denominator factors as
$x^2 - x - 12 = (x + 3)(x - 4)$,
so there are vertical asymptotes at $x = -3$ and $x = 4$.
And because the degree of the numerator is less than the degree of the denominator, the horizontal asymptote is $y = 0$. The graph supports this information and allows us to conclude that
$\lim_{x\to-3^-} h(x) = -\infty$, $\lim_{x\to-3^+} h(x) = \infty$, $\lim_{x\to4^-} h(x) = -\infty$, and $\lim_{x\to4^+} h(x) = \infty$.
The graph shows no local extrema.

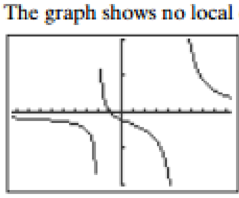


[–5.875, 5.875] by [–3.1, 3.1]

Intercepts: $\left(0, \frac{1}{12}\right)$, $(1, 0)$
Domain: $(-\infty, -3) \cup (-3, 4) \cup (4, \infty)$
Range: $(-\infty, \infty)$
Continuity: All $x \neq -3, 4$
Decreasing on $(-\infty, -3)$, $(-3, 4)$, and $(4, \infty)$
Not symmetric
Unbounded
No local extrema
Horizontal asymptote: $y = 0$
Vertical asymptotes: $x = -3$ and $x = 4$
End behavior: $\lim_{x\to-\infty} h(x) = \lim_{x\to\infty} h(x) = 0$

40. For $k(x) = (x + 1)/(x^2 - 3x - 10)$, the numerator is zero when $x = -1$, so the x-intercept of the graph is -1. Because $k(0) = -1/10$, the y-intercept is $-1/10$. The denominator factors as
$x^2 - 3x - 10 = (x + 2)(x - 5)$,
so there are vertical asymptotes at $x = -2$ and $x = 5$.

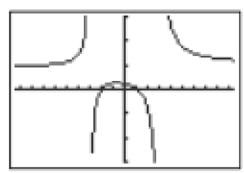
And because the degree of the numerator is less than the degree of the denominator, the horizontal asymptote is $y = 0$. The graph supports this information and allows us to conclude that
$\lim_{x\to-2^-} k(x) = -\infty$, $\lim_{x\to-2^+} k(x) = \infty$,
$\lim_{x\to5^-} k(x) = -\infty$, and $\lim_{x\to5^+} k(x) = \infty$.
The graph shows no local extrema.



[–9.4, 9.4] by [–1, 1]

Intercepts: $(-1, 0)$, $(0, -0.1)$
Domain: $(-\infty, -2) \cup (-2, 5) \cup (5, \infty)$
Range: $(-\infty, \infty)$
Continuity: All $x \neq -2, 5$
Decreasing on $(-\infty, -2)$, $(-2, 5)$, and $(5, \infty)$
Not symmetric
Unbounded
No local extrema
Horizontal asymptote: $y = 0$
Vertical asymptotes: $x = -2$ and $x = 5$
End behavior: $\lim_{x\to-\infty} k(x) = \lim_{x\to\infty} k(x) = 0$

41. For $f(x) = (x^2 + x - 2)/(x^2 - 9)$, the numerator factors as
$x^2 + x - 2 = (x + 2)(x - 1)$,
so the x-intercepts of the graph are -2 and 1. Because $f(0) = 2/9$, the y-intercept is $2/9$. The denominator factors as
$x^2 - 9 = (x + 3)(x - 3)$,
so there are vertical asymptotes at $x = -3$ and $x = 3$. And because the degree of the numerator equals the degree of the denominator with a ratio of leading terms that equals 1, the horizontal asymptote is $y = 1$. The graph supports this information and allows us to conclude that
$\lim_{x\to-3^-} f(x) = \infty$, $\lim_{x\to-3^+} f(x) = -\infty$, $\lim_{x\to3^-} f(x) = -\infty$, and $\lim_{x\to3^+} f(x) = \infty$.
The graph also shows a local maximum of about 0.260 at about $x = -0.675$.



[–9.4, 9.4] by [–3, 3]

Intercepts: $(-2, 0)$, $(1, 0)$, $\left(0, \frac{2}{9}\right)$
Domain: $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$
Range: $(-\infty, 0.260] \cup (1, \infty)$
Continuity: All $x \neq -3, 3$
Increasing on $(-\infty, -3)$ and $(-3, -0.675]$
Decreasing on $[-0.675, 3)$ and $(3, \infty)$
Not symmetric
Unbounded
Local maximum at about $(-0.675, 0.260)$
Horizontal asymptote: $y = 1$
Vertical asymptotes: $x = -3$ and $x = 3$
End behavior: $\lim_{x\to-\infty} f(x) = \lim_{x\to\infty} f(x) = 1$

42. For $g(x) = (x^2 - x - 2)/(x^2 - 2x - 8)$, the numerator factors as
$x^2 - x - 2 = (x + 1)(x - 2)$,
so the x-intercepts of the graph are -1 and 2. Because $g(0) = 1/4$, the y-intercept is $1/4$. The denominator factors as
$x^2 - 2x - 8 = (x + 2)(x - 4)$,
so there are vertical asymptotes at $x = -2$ and $x = 4$. And because the degree of the numerator equals the degree of the denominator with a ratio of leading terms that equals 1,