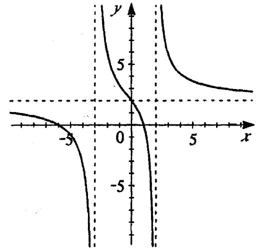
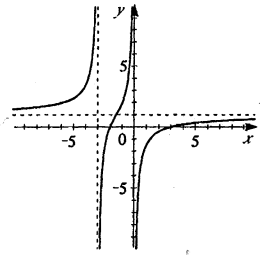
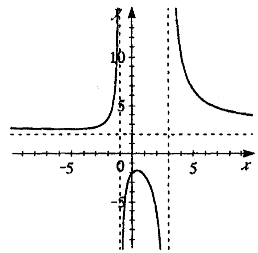
39. $r(x) = \dfrac{2x^2 + 10x - 12}{x^2 + x - 6} = \dfrac{2(x-1)(x+6)}{(x-2)(x+3)}$. When $x = 0$, $y = \frac{2(-1)(6)}{(-2)(3)} = 2$, so the y-intercept is 2. When $y = 0$, $2(x-1)(x+6) = 0 \Rightarrow x = -6, 1$, so the x-intercepts are -6 and 1. Vertical asymptotes occur when $(x-2)(x+3) = 0 \Leftrightarrow x = -3$ or $x = 2$. Because the degree of the numerator and denominator are the same the horizontal asymptote is $y = \frac{2}{1} = 2$.



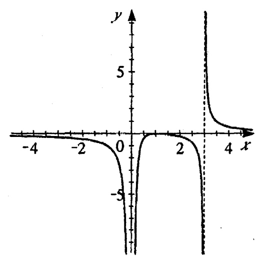
41. $y = \dfrac{x^2 - x - 6}{x^2 + 3x} = \dfrac{(x-3)(x+2)}{x(x+3)}$. The x-intercept occurs when $y = 0$ $\Leftrightarrow (x-3)(x+2) = 0 \Rightarrow x = -2, 3$, so the x-intercepts are -2 and 3. There is no y-intercept because y is undefined when $x = 0$. The vertical asymptotes are $x = 0$ and $x = -3$. Because the degree of the numerator and denominator are the same, the horizontal asymptotes is $y = \frac{1}{1} = 1$.



43. $r(x) = \dfrac{3x^2 + 6}{x^2 - 2x - 3} = \dfrac{3(x^2 + 2)}{(x-3)(x+1)}$. When $x = 0$, $y = -2$, so the y-intercept is -2. Since the numerator can never equal zero, there is -2. Since the numerator can never equal zero, there is no x-intercept. Vertical asymptotes occur when $x = -1, 3$. Because the degree of the numerator and denominator are the same, the horizontal asymptote is.$y = \frac{3}{1} = 3$.



45. $s(x) = \dfrac{x^2 - 2x + 1}{x^3 - 3x^2} = \dfrac{(x-1)^2}{x^2(x-3)}$. Since $x = 0$ is not in the domain of $s(x)$, there is no y-intercept. The x-intercept occurs when $y = 0$ $\Leftrightarrow x^2 - 2x + 1 = (x-1)^2 = 0 \Rightarrow x = 1$, so the x-intercept is 1. Vertical asymptotes occur when $x = -1, 3$. Since the degree of the numerator is less than the degree of the denominator, the horizontal asymptote is $y = 0$.



47. $r(x) = \dfrac{x^2}{x-2}$. When $x = 0$, $y = 0$, so the graph passes through the origin. There is a vertical asymptote when $x - 2 = 0 \Leftrightarrow x = 2$, with $y \to \infty$ as $x \to 2^+$, and $y \to -\infty$ as $x \to 2^-$. Because the degree of the numerator is greater than the degree of the denominator, there is no horizontal asymptotes. By using long division, we see that $y = x + 2 + \dfrac{4}{x-2}$, so $y = x + 2$ is a slant asymptote.