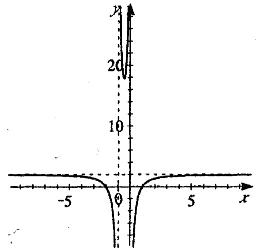
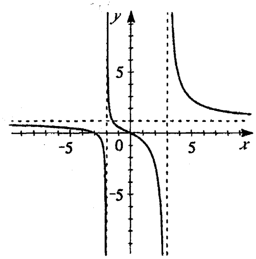
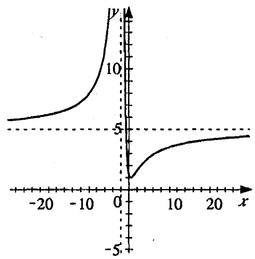
40. $r(x) = \dfrac{2x^2 + 2x - 4}{x^2 + x} = \dfrac{2(x+2)(x-1)}{x(x+1)}$. Vertical asymptotes occur at $x = 0$ and $x = -1$. Since x cannot equal zero, there is no y-intercept. When $y = 0$, we have $x = -2$ or 1, so the x-intercepts are -2 and 1. Because the degree of the denominator and numerator are the same, the horizontal asymptote is $y = \frac{2}{1} = 2$.



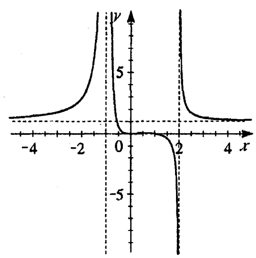
42. $r(x) = \dfrac{x^2 + 3x}{x^2 - x - 6} = \dfrac{x(x+3)}{(x-3)(x+2)}$. When $x = 0$, we have $y = 0$, so the graph passes through the origin. When $y = 0$, we have $x = 0$ or -3, so the x-intercepts are 0 and -3. Vertical asymptotes occur at $x = -2$ and $x = 3$. Because the degree of the denominator and numerator are the same, the horizontal asymptote is $y = \frac{1}{1} = 1$.



44. $r(x) = \dfrac{5x^2 + 5}{x^2 + 4x + 4} = \dfrac{5(x^2+1)}{(x+2)^2}$. When $x = 0$, we have $y = \frac{5}{4}$, so the y-intercept is $\frac{5}{4}$. Since $x^2 + 1 > 0$ for all real x, y never equals zero, and there are no x-intercepts. The vertical asymptote is $x = -2$. Because the degree of the denominator and numerator are the same, the horizontal asymptote occurs at $y = \frac{5}{1} = 5$.



46. $r(x) = \dfrac{x^3 - x^2}{x^3 - 3x - 2} = \dfrac{x^2(x-1)}{x^3 - 3x - 2}$. When $x = 0$, we have $y = 0$, so the y-intercept is 0. When $y = 0$, we have $x^2(x-1) = 0$, so the x-intercepts are 0 and 1. Vertical asymptotes occur when $x^3 - 3x - 2 = 0$. Since $x^3 - 3x - 2 = 0$ when $x = 2$, we can factor $(x-2)(x+1)^2 = 0$, so the vertical asymptotes occur at $x = 2$ and $x = -1$. Because the degree of the denominator and numerator are the same, the horizontal asymptote is $y = \frac{1}{1} = 1$.



48. $r(x) = \dfrac{x^2 + 2x}{x - 1} = \dfrac{x(x+2)}{x-1}$. When $x = 0$, we have $y = 0$, so the graph passes through the origin. Also, when $y = 0$, we have $x = 0$ or -2, so the x-intercepts are -2 and 0. The vertical asymptote is $x = 1$. There is no horizontal asymptote, and the line $y = x + 3$ is a slant asymptote because by long division, we have $y = x + 3 + \dfrac{2}{x-1}$.