Write the partial fraction decomposition for the rational expression.

$$\frac{x+7}{x^2-x-6} = \frac{A(x+2)}{x-3} + \frac{B(x-3)}{x+2} \qquad \frac{2}{x-3} - \frac{1}{x+2}$$

$(x-3)(x+2)$

$x+7 = A(x+2) + B(x-3)$

Let $x=-2$

$-2+7 = \cancel{A(-2+2)} + B(-2-3)$

$5 = -5B$

$B = -1$

Let $x=3$

$3+7 = A(3+2) + \cancel{B(3-3)}$

$10 = 5A$

$A = 2$

Write the partial fraction decomposition for the rational expression.

$$\frac{1}{2x^2+x} = \frac{A}{x} + \frac{B}{2x+1}$$

$x(2x+1)$

$2x+1=0$

$2x=-1$

$x=-\frac{1}{2}$

$\frac{1}{x} - \frac{2}{2x+1}$

$1 = A(2x+1) + Bx$

Let $x = -\frac{1}{2}$

$(-2)(1) = \left(-\frac{1}{2}B\right)(-2)$

$B = -2$

Let $x=0$

$1 = A(2(0)+1) + B(0)$

$1 = A$

Write the partial fraction decomposition for the rational expression.

$$\frac{x+1}{x^2+4x+3} = \frac{A}{x+3} + \frac{B}{x+1}$$

$$\frac{1}{x+3} + 0$$

$$\frac{\cancel{x+1}}{\cancel{(x+1)}(x+3)}$$

$$x+1 = A(x+1) + B(x+3)$$

Let $x = -1$

$$0 = -2B$$

$$B = 0$$

Write the partial fraction decomposition for the rational expression.

$$\frac{x^2+12x+12}{x^3-4x} = \frac{A^{(x-2)(x+2)}}{x} + \frac{B^{x(x-2)}}{x+2} + \frac{C^{x(x+2)}}{x-2}$$

$$-\frac{3}{x} - \frac{1}{x+2} + \frac{5}{x-2}$$

Let $x=0$
Let $x=2$
Let $x=-2$

$x(x^2-4)$

$x(x+2)(x-2)$

$$x^2+12x+12 = A(x-2)(x+2) + Bx(x-2) + Cx(x+2)$$

Let $x=0$

$$0^2+12(0)+12 = A(0-2)(0+2) + B(0)(0-2) + C(0)(0+2)$$

$$12 = -4A$$

$$A=-3$$

Let $x=2$

$$2^2+12(2)+12 = A(2-2)(2+2) + B(2)(2-2) + C(2)(2+2)$$

$$40 = 8C$$

$$C = 5$$

Let $x=-2$

$$(-2)^2+12(-2)+12 = A(-2-2)(-2+2) + B(-2)(-2-2) + C(-2)(-2+2)$$

$$-8 = 8B$$

$$B=-1$$

Write the partial fraction decomposition for the rational expression.

$$\frac{1}{4x^2-9}$$

Write the partial fraction decomposition for the rational expression.

$$\frac{x}{x^3 - x} = \frac{A}{x} + \frac{B}{x-1} + \frac{C}{x+1}$$

$$\frac{\frac{1}{2}}{x-1}$$

$$\frac{0}{x} + \frac{1}{2(x-1)} - \frac{1}{2(x+1)}$$

$x(x^2-1)$

$x(x-1)(x+1)$

$$x = A(x-1)(x+1) + B(x)(x+1) + C(x)(x-1)$$

Let $x=0$

$$0 = A(0-1)(0+1) + B(0)(0+1) + C(0)(0-1)$$

$$A = 0$$

Let $x=1$

$$1 = A(1-1)(1+1) + B(1)(1+1) + C(1)(1-1)$$

$$1 = 2B$$

$$B = \frac{1}{2}$$

Let $x=-1$

$$-1 = A(-1-1)(-1+1) + B(-1)(-1+1) + C(-1)(-1-1)$$

$$-1 = 2C$$

$$-\frac{1}{2} = C$$

Write the partial fraction decomposition for the rational expression.

$$\frac{15x^2 - 11x - 5}{2x^3 - 3x^2 - 5x}$$

$3A + 2B = 7$

$4A - 6B = 81$

$$\frac{A}{x+1} + \frac{Bx + C}{x^2 + x + 1}$$