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Expand the quotient by partial fractions.

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

First, note the given fraction is not a proper fraction. Divide the numerator by the denominator to get a polynomial plus a proper fraction.

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

Factor the denominator of the remaining fraction.

$$x^2-3x+2 = (x-1)(x-2)$$

Since there are two distinct linear factors, write the decomposition as shown.

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

Subtract 1 from both sides and then multiply both sides by the least common denominator, $(x-1)(x-2)$.

$$\frac{3x+3}{x^2-3x+2} = \frac{A}{x-1} + \frac{B}{x-2}$$ Subtract 1 from both sides.

$$3x+3 = A(x-2) + B(x-1)$$ Multiply by $(x-1)(x-2)$.

$$3x+3 = (A+B)x + (-2A-B)$$ Collect like terms.

Equate the coefficients of x.

$$A+B=3$$

Equate the constants.

$$-2A-B=3$$

Solve the system of equations $A+B=3$ and $-2A-B=3$. First solve $A+B=3$ for B.

$$B=3-A$$

Substitute for B in the equation $-2A-B=3$ and solve for A.

$$-2A-(3-A) = 3$$
$$-A-3 = 3$$
$$A = -6$$

Then use $A=-6$ to find B.

$$B=3-(-6)=9$$

Therefore, the partial fraction decomposition is as shown.

$$\frac{x^2+5}{x^2-3x+2} = 1 + \frac{A}{x-1} + \frac{B}{x-2}$$
$$= 1 - \frac{6}{x-1} + \frac{9}{x-2}$$