

## Partial Fraction Decomposition - SaitechAI

**(10)**  $\frac{x+2}{(x+1)(x^2+1)} = \frac{A}{x+1} + \frac{Bx+C}{x^2+1}$   
Equating coefficients gives:  $\begin{cases} A+B=0 \\ B+C=1 \\ A+C=2 \end{cases}$  Solving:  $(A = \frac{1}{2}, B = -\frac{1}{2}, C = \frac{3}{2})$   
 $\boxed{\frac{x+2}{(x+1)(x^2+1)} = \frac{1/2}{x+1} + \frac{-\frac{1}{2}x + \frac{3}{2}}{x^2+1}}$

**(11)**  $\frac{7x^2 - 25x + 6}{(x^2 - 2x - 1)(3x - 2)} = \frac{Ax + B}{x^2 - 2x - 1} + \frac{C}{3x - 2}$   
Equating coefficients gives:  $\begin{cases} 3A + C = 7 \\ -2A + 3B - 2C = -25 \\ -2B - C = 6 \end{cases}$  Solving:  $(A = 1, B = -5, C = 4)$   
 $\boxed{\frac{7x^2 - 25x + 6}{(x^2 - 2x - 1)(3x - 2)} = \frac{x - 5}{x^2 - 2x - 1} + \frac{4}{3x - 2}}$

**(12)**  $\frac{x^2 + x + 1}{(x+1)^2} = A + \frac{B}{x+1} + \frac{C}{(x+1)^2}$   
Equating coefficients gives:  $\begin{cases} A = 1 \\ 2A + B = 1 \\ A + B + C = 1 \end{cases}$  Solving:  $(A = 1, B = -1, C = 1)$   
 $\boxed{\frac{x^2 + x + 1}{(x+1)^2} = 1 - \frac{1}{x+1} + \frac{1}{(x+1)^2}}$