

Partial Fractions

→ reverses the process of combining fractions

$$\textcircled{\text{ex}} \quad \frac{5x+7}{x^2+2x-3} = \frac{5x+7}{(x-1)(x+3)} = \left(\frac{A}{x-1} + \frac{B}{x+3} \right) (x-1)(x+3)$$

$$5x+7 = A(x+3) + B(x-1)$$

• $x = -3$

$$5(-3) + 7 = A(-3+3) + B(-3-1)$$

$$-8 = A(0) + B(-4)$$

$$-8 = 0 - 4B$$

$$-8 = -4B$$

$$2 = B$$

• $x = 1$

$$5(1) + 7 = A(1+3) + B(1-1)$$

$$12 = 4A$$

$$3 = A$$

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

(ex) Decompose into partial fractions:

$$\frac{3x-8}{x^2-4x-5} = \frac{3x-8}{(x+1)(x-5)} = \frac{A}{x+1} + \frac{B}{x-5}$$

$$3x-8 = A(x-5) + B(x+1)$$

$$\underline{x=5}$$

$$3(5)-8 = A(5-5) + B(5+1)$$

$$7 = 6B$$

$$\frac{7}{6} = B$$

$$\underline{x=-1}$$

$$3(-1)-8 = A(-1-5) + B(-1+1)$$

$$-11 = -6A$$

$$\frac{11}{6} = A$$

$$= \frac{\frac{11}{6}}{x+1} + \frac{\frac{7}{6}}{x-5}$$

$$= \frac{11}{6(x+1)} + \frac{7}{6(x-5)}$$