

NOTES

WRITE THE PARTIAL FRACTION DECOMPOSITION.

①

$$\frac{1}{x^2+2x} = \frac{1}{x(x+2)} = \frac{\left(\frac{1}{2}\right)}{x} + \frac{-\left(\frac{1}{2}\right)}{x+2} = \frac{1}{2x} - \frac{1}{2(x+2)}$$

$$\frac{1}{x(x+2)} = \frac{(x+2)A}{(x+2)x} + \frac{Bx}{(x+2)x}$$

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

x terms

$$\frac{0}{x} = \frac{Ax}{x} + \frac{Bx}{x}$$

$$0 = A + B$$

constants

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

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

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

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

$$x=0$$

$$1 = 2A$$

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

$$x = -2$$

$$1 = -2B$$

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

- ① Factor the denominator
- * ② Put A + B
- ③ Find Common Denominator
- ④ Write down numerators
- ⑤ Find when denominator = 0
- ⑥ Solved for A and B

$$\textcircled{2} \quad \frac{6}{x^2-9} = \frac{6}{(x+3)(x-3)} = \frac{A}{x+3} + \frac{B}{x-3} = \frac{-1}{x+3} + \frac{1}{x-3}$$

$$\frac{6}{(x+3)(x-3)} = \frac{A(x-3)}{(x+3)(x-3)} + \frac{B(x+3)}{(x-3)(x+3)}$$

$$6 = A(x-3) + B(x+3)$$

$$\begin{aligned} x=3 \\ 6=6B \\ \underline{1=B} \end{aligned}$$

$$\begin{aligned} x=-3 \\ 6=-6A \\ \underline{A=-1} \end{aligned}$$