

5. Find  $\int xe^x dx$ . CHECK your answer

$$u = x \quad v = e^x$$

$$du = dx \quad dv = e^x dx$$

$$uv - \int v du = xe^x - \int e^x dx = \boxed{xe^x - e^x + C}$$

$$\frac{d}{dx} (PA) = \frac{d}{dx} (xe^x - e^x) = xe^x + e^x - e^x \quad \checkmark$$

6. Find  $\int \frac{1}{\sqrt{x^2 + 4x + 5}} dx = \int \frac{dx}{(x+2)^2 + 1} \stackrel{\uparrow}{=} \int \sec \theta d\theta = \ln |\sec \theta + \tan \theta| + C$

$$x+2 = \tan \theta$$

$$(x+2)^2 + 1 = \sec^2 \theta$$

$$dx = \sec \theta \tan \theta d\theta$$

$$= \boxed{\ln |\sqrt{x^2 + 4x + 5} + x + 2| + C}$$

$$\checkmark \frac{d}{dx} (PA) = \frac{\frac{2(x+2)}{2\sqrt{x^2+4x+5}} + 1}{\sqrt{x^2+4x+5} + x+2} = \frac{x+2 + \sqrt{x^2+4x+5}}{\sqrt{x^2+4x+5}(\sqrt{x^2+4x+5} + x+2)} \quad \checkmark$$