

Question 1: Evaluate

$$\int \frac{x-1}{(x+1)^3} e^x dx$$

Solution:

$$\int \frac{x-1}{(x+1)^3} e^x dx,$$

$$= \int e^x \left(\frac{(x+1)}{(x+1)^3} - \frac{2}{(x+1)^3} \right) dx$$

$$= \int e^x \left(\frac{1}{(x+1)^2} - \frac{2}{(x+1)^3} \right) dx$$

$$= \frac{e^x}{(x+1)^2} + c$$

Using formula,

$$\frac{d}{dx} \left(\frac{1}{(x+1)^2} \right) = -\frac{2}{(x+1)^3}$$