

## Question

Use integration by parts to find a simplified expression for.

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

$$x e^{x + \frac{1}{x}} + C$$

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

IF THIS IS TO BE NOTICABLE, IT MUST  
 GIVE US THE TRIAL  $e^{x + \frac{1}{x}}$

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

THIS RESEMBLES THE INTEGRAND FIRST

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

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

BY PARTS THREE

$u$	$v$
$e^{x + \frac{1}{x}}$	$\left(1 - \frac{1}{x^2}\right) e^{x + \frac{1}{x}}$

$$= \int e^{x + \frac{1}{x}} dx + \underbrace{x e^{x + \frac{1}{x}} - \int e^{x + \frac{1}{x}} dx}_{\text{BY PARTS}}$$

$$= x e^{x + \frac{1}{x}} + C$$