

Question 1

Choose the shortest method and evaluate:

$$\int x e^{x^2} dx.$$

Question 1 – Solution

Step 1: Identify the inner function. The exponent is x^2 , and its derivative $2x$ is present except for a constant factor.

Step 2: Substitute $u = x^2$. Then

$$du = 2x \, dx, \quad x \, dx = \frac{1}{2} du.$$

Step 3: Rewrite and integrate.

$$\begin{aligned} \int x e^{x^2} \, dx &= \frac{1}{2} \int e^u \, du \\ &= \frac{1}{2} e^u + C. \end{aligned}$$

Step 4: Return to x .

$$\boxed{\frac{1}{2} e^{x^2} + C}$$