Find the integral of $x \cos ax^2 \, dx$ with respect to x

a. $\cos^3 x + c$

b. $\sin^2 x + c$

c. $\sec^2 x + 1$

d. $\frac{1}{2a} \sin ax^2 + c$

Solution.

Let's integrate it:

$$\int x \cos ax^2 \, dx$$

Substitute $ax^2 = t$, then $dt = 2axdx$. We have

$$\int x \cos ax^2 \, dx = \int \frac{1}{a2} \cos ax^2 \cdot 2axdx = \frac{1}{2a} \int \cos t \, dt = \frac{1}{2a} \sin t + c$$

Substitute back $t = ax^2$:

$$\frac{1}{2a} \sin t + c = \frac{1}{2a} \sin ax^2 + c$$

Answer:

d. $\frac{1}{2a} \sin ax^2 + c$.

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