Answer on Question #61960 – Math – Calculus

Question

1. Evaluate $\int e^{4x}dx$.

14e4x+c

ex+c

3ex3+c

13ex+c

Solution

Using the substitution method we obtain

$$\int e^{4x}dx = \left\{\begin{matrix} 4x = y, x = \frac{y}{4} \\ dx = \frac{1}{4}dy \end{matrix}\right\} = \int \frac{e^y}{4}dy = \frac{e^y}{4} + c = \frac{e^{4x}}{4} + c,$$

where c is an integration constant.

Answer: $\frac{e^{4x}}{4} + c$.

Question

2. Evaluate $\int xe^{6x}dx$.

x6e6x−1136e6x+c

x3e6x+116e6x+c

x6e6x+1136e6x+c

−x6e6x+1136e6x+c

Solution

Using integration by parts we get

$$\int xe^{6x}dx = \left\{\begin{matrix} u = x, du = dx \\ dv = e^{6x}dx, v = \frac{e^{6x}}{6} \end{matrix}\right\} = \frac{x}{6}e^{6x} - \int \frac{e^{6x}}{6}dx = \frac{x}{6}e^{6x} - \frac{e^{6x}}{36} + c,$$

where c is an integration constant.

Answer: $\frac{x}{6}e^{6x} - \frac{e^{6x}}{36} + c$.

Question

3. Find $\int x\cos(ax^2)\,dx$ with respect to x
cos3x+c

sin2x+c

sec2x+1

12asinax2+c

Solution

If $a \neq 0$**,** then using the substitution method we obtain

$$\int x\cos(ax^2)\,dx = \frac{1}{2a}\int 2ax\cos(ax^2)\,dx = \frac{1}{2a}\int \cos(ax^2)\,d(ax^2) = \{ax^2 = y\} =$$

$$= \frac{1}{2a}\int \cos y\,dy = \frac{\sin y}{2a} + c = \frac{\sin(ax^2)}{2a} + c,$$

where $a \neq 0$; c is an integration constant.

If $a = 0$, then $\cos(ax^2) = \cos(0) = 1$ and

$$\int x\cos(ax^2)dx = \int xdx = \frac{x^2}{2} + c,$$

where $a = 0$; c is an integration constant.

Answer: $\frac{\sin(ax^2)}{2a} + c,\ a \neq 0.$