Name: [illegible]
Matric No: [illegible]
Course: [illegible]

1. $2x^2 \ln x$

Solution

$\int 2x^2 \ln x \, dx$

$\int 2x^2 \times \ln(x) \, dx$

$2 \int x^2 \times \ln(x) \, dx$

$2 \int \ln(x) \times x^2 \, dx$

$2\left(\ln(x) \times \frac{x^3}{3} - \int \frac{x^3}{3} \times \frac{1}{x} \, dx\right)$

$2\left(\ln(x) \times \frac{x^3}{3} - \int \frac{x^2}{3} \, dx\right)$

$2\left(\ln(x) \times \frac{x^3}{3} - \frac{1}{3} \times \int x^2 \, dx\right)$

$2\left(\ln x \times \frac{x^3}{3} - \frac{1}{3} \times \frac{x^3}{3}\right)$

$\frac{2x^3 \times \ln(x)}{3} - \frac{2x^3}{9}$

$= \frac{2x^3 \ln(x)}{3} - \frac{2x^3}{9} + c$ //

2. $3te^{2t}$

Solution

$\int 3te^{2t} \, dt$

$3 \int te^{2t} \, dt$

$3\left(t \times \frac{e^{2t}}{2} - \int \frac{e^{2t}}{2} \, dt\right)$

$3\left(t \times \frac{e^{2t}}{2} - \frac{1}{2} \int e^{2t} \, dt\right)$

$3\left(t \times \frac{e^{2t}}{2} - \frac{1}{2} \times \frac{1}{2} e^{2t}\right)$

$= \frac{2te^{2t}}{2} - \frac{3e^{2t}}{4} + C$

$x^2 \sin x$

Solution

$$\int x^2 \sin x \, dx$$

$$x^2 \times (-\cos(x)) - \int -\cos(x) \times 2x \, dx$$

$$x^2 \times (-\cos(x)) - (\times(-2) \times \int \cos(x) \times x \, dx$$

$$x^2 - x^2(-\cos(x)) + 2x \int x \times \cos(x) \, dx$$

$$x^2(-\cos x) + 2(x \sin x - \int \sin x \, dx)$$

$$x^2 \times (-\cos x) + 2(x \sin x) - (-\cos x)$$

$$-x^2 \cos x + 2x \sin x + 2\cos x$$

$$-x^2 \cos x + 2x \sin x + 2\cos x + C$$

$$= -x^2 \cos x + 2x \sin(x) + 2\cos x + C //$$

$\cos 5x \cos 6x$

Solution

$$\int \cos(5x) \cos(6x) \, dx$$

$$\int \frac{1}{2} \times (\cos(-x) + \cos(11x)) \, dx$$

$$\int \frac{1}{2}(\cos x + \cos 11x) \, dx$$

$$\frac{1}{2} \times \int \cos x + \cos 11x \, dx$$

$$\frac{1}{2} \times \left(\int \cos x \, dx + \int \cos 11x \, dx \right)$$

$$\frac{1}{2} \times \left(\sin x + \frac{\sin 11x}{11} \right)$$

$$= \frac{\sin(x)}{2} + \frac{\sin(11x)}{22} + C$$

4. $\sin 7x \cos 2x$

Solution

$$\int \sin 7x \cos 2x \, dx$$

$$\int \frac{1}{2}(\sin 9x + \sin 5x)\, dx$$

$$\frac{1}{2}\int \sin 9x + \sin 5x \, dx$$

$$\frac{1}{2}\int \sin 9x \, dx + \int \sin 5x \, dx$$

$$\frac{1}{2}\left(\frac{-\cos 9x}{9} - \frac{\cos 5x}{5}\right)$$

$$-\frac{-\cos 9x}{18} - \frac{\cos 5x}{10} + c$$