

NAME: - IKUOMOLA TOMISIN ELIZABETH

MATRIC NO: - 19/SCIO51004

DEPARTMENT: - MICROBIOLOGY

COURSE CODE: - MAT 104

### Assignment

1)  $\int e^x \sin x dx$

$u = \sin x, dv = e^x dx$

$\frac{du}{dx} = \cos x dx, v = e^x$

$\int e^x \sin x dx = e^x \sin x - \int e^x \cos x dx$

$u = \cos x, dv = e^x dx$

$du = -\sin x dx, v = e^x$

$\int e^x \sin x dx = e^x \sin x - [e^x \cos x + \int e^x \sin x dx]$

$2 \int e^x \sin x dx = e^x \sin x - e^x \cos x - \int e^x \sin x dx + \int e^x \sin x dx$

$2 \int e^x \sin x dx = e^x \sin x - e^x \cos x$

$\int e^x \sin x dx = \frac{e^x \sin x - e^x \cos x}{2}$

$\int e^x \sin x dx = \frac{1}{2} (e^x \sin x - e^x \cos x) + C$

2.)  $\int 2x^2 \ln x dx$

Soln

$u = \ln x, dv = 2x^2 dx$

$\frac{du}{dx} = \frac{1}{x}, v = \frac{x^3}{2/3}$

$dx = x du \Rightarrow \int u dv = uv - \int v du$

$\int \ln x 2x^2 dx = \ln x \frac{x^3}{2/3} - \int \frac{x^3}{2/3} \frac{1}{x}$

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

$= \ln x \left(\frac{x^3}{2/3}\right) - \int \frac{x^2}{2/3} dx \Rightarrow \frac{1}{2/3} \int x^2 dx \Rightarrow \ln x \left(\frac{x^3}{2/3}\right) - \frac{x^3}{2} + C$

$$3) \int x^2 \sin x dx$$

Soln.

$$u = x^2, \quad dv = \sin x$$

$$\frac{du}{dx} = 2x, \quad v = -\cos x$$

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

$$\int x \cos x dx$$

$$u = x, \quad \frac{dv}{dx} = \cos x \Rightarrow \frac{du}{dx} = 1, \quad v = \sin x$$

$$\int x \cos x dx = x \sin x - \int \sin x dx$$

$$= x \sin x - (-\cos x) \Rightarrow \boxed{x \sin x + \cos x}$$

$$\Rightarrow -x^2 \cos x + 2 [x \sin x + \cos x] + C$$

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

$$4) \int x \cos x dx$$

Soln

$$u = x, \quad dv = \cos x dx$$

$$\frac{du}{dx} = 1, \quad v = \sin x$$

$$\int u dv = uv - \int v du$$

$$\int x \cos x dx = x(\sin x) - \int \sin x dx \\ = x \sin x + \cos x + C$$