NAME: ABIOYE BADRIYYAH OYENIKE
MATRIC NO: 19/MHS01/010 MBBS.

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

$u = \ln x \quad dv = 2x^2$

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

$du = \frac{1}{x} dx$

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

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

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

$= \frac{2}{3} x^3 \ln x - \frac{2x^3}{9} + C$

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

2. $\int 3be^{2b} db$

$u = 3b \quad dv = e^{2b}$

$\frac{du}{db} = 3 \quad v = \frac{e^{2b}}{2}$

$du = 3\,db$

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

$= 3b \cdot \frac{e^{2b}}{2} - \int \frac{e^{2b}}{2} \cdot 3\,db$

$= \frac{3}{2} be^{2b} - \frac{3}{2} \int e^{2b} db$

$= \frac{3}{2} be^{2b} - \frac{3}{4} e^{2b} + C$

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

$u = x^2 \quad dv = \sin x \quad v = \cos x$

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

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

$\int x^2 \sin x \, dx = x^2 \cdot \cos x - \int \cos x \, 2x \, dx$

$= x^2 \cos x - 2 \int x \cos x \, dx$

$\int x \cos x \, dx$

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

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

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

$= x \sin x - \int \sin x$

$x \cos x \, dx = x \sin x + \cos x + C$

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

4. $\cos 5x \cos 6x$

$\cos A \cos B = \frac{1}{2}(\cos(A+B) + \cos(A-B))$

$\cos 5x \cos 6x = \frac{1}{2}(\cos(5x+6x) + \cos(5x-6x))$

$= \frac{1}{2}(\cos 11x - \cos x)$

$\int \cos 5x \cos 6x = \frac{1}{2}\left(\frac{1}{11}\sin x - \sin x\right)$

$= \frac{1}{22}\sin x - \frac{1}{2}$

$\int \cos 5x \cos 6x = \frac{1}{22}\sin 11x - \frac{1}{2}\sin x + C$

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

$\sin A \cos B = \frac{1}{2}(\sin(A+B) + \sin(A-B))$

$\sin 7x \cos 2x = \frac{1}{2}(\sin(7x+2x) + \sin(7x-2x))$

$= \frac{1}{2}(\sin 9x + \sin 5x)$

$\int \sin 7x \cos 2x = \frac{1}{2}\left(\frac{-1}{9}\cos 9x - \frac{1}{5}\cos 5x\right)$

$\int \sin 7x \cos 2x = \frac{-1}{18}\cos 9x - \frac{1}{10}\cos 5x + C$