

NAME - NDU-UHAMADU ADAEZE (HIBINMA)  
MATHS NO - 19/MHSUJ/257  
DEPARTMENT - MEDICINE AND SURGERY  
ASSIGNMENT II  
NO 1, 2

1.  $\int 2n^2 \ln n$

SOLUTION

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

$$u = \ln n, \quad du = \frac{1}{n}, \quad dv = 2n^2, \quad v = \frac{2n^3}{3}$$

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

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

$$\int 2n^2 \ln n = \frac{2n^3 \ln n}{3} - \frac{2 \cdot n^2}{3 \cdot 2}$$

$$\int 2n^2 \ln n = \frac{2n^3 \ln n}{3} - \frac{2n^2}{4} + C$$

$$\int 2n^2 \ln n = \frac{2}{3} \left( \frac{1}{3} \ln n n^3 - \frac{1}{4} n^2 \right) + C$$

2.  $\int 3te^{2t}$

SOLUTION

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

$$u = 3t, \quad du = 3, \quad dv = e^{2t}, \quad v = \frac{e^{2t}}{2}$$

$$\int 3te^{2t} = \frac{3t \cdot e^{2t}}{2} - \int \frac{e^{2t} \cdot 3}{2}$$

$$\int 3te^{2t} = \frac{3te^{2t}}{2} - \int \frac{3e^{2t}}{2}$$

$$\int 3te^{2t} = \frac{3te^{2t}}{2} - \frac{3}{2} \int e^{2t}$$

$$\int 3te^{2t} = \frac{3te^{2t}}{2} - \frac{3 \cdot e^{2t}}{2 \cdot 2}$$

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

$$\int 3te^{2t} = \frac{3}{2} \left( \frac{1}{2} te^{2t} - \frac{1}{4} e^{2t} \right) + C$$

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 NO 3, 4

3.  $\int n^2 \sin n$

SOLUTION

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

$$u = n^2, du = 2n, dv = \sin n, v = -\cos n$$

$$\int n^2 \sin n = -n^2 \cos n - \int -\cos n \cdot 2n$$

$$\int n^2 \sin n = -n^2 \cos n - \int -2n \cos n$$

$$\int n^2 \sin n = -n^2 \cos n - [u = 2n, du = 2, dv = -\cos n, v = -\sin n]$$

$$\int n^2 \sin n = -n^2 \cos n - [-2n \sin n - \int -2 \sin n]$$

$$\int n^2 \sin n = -n^2 \cos n + 2n \sin n - \int 2 \sin n$$

$$\int n^2 \sin n = -n^2 \cos n + 2n \sin n - (-2 \cos n)$$

$$\int n^2 \sin n = -n^2 \cos n + 2n \sin n + 2 \cos n + C$$

4.  $\int \cos 5n \cos 6n$

SOLUTION

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

$$A = 5n, B = 6n$$

$$\int \cos 5n \cos 6n = \frac{1}{2} [\cos(11n) + \cos(-n)]$$

$$\text{Recall, } \cos(-\theta) = \cos \theta \therefore \cos(-n) = \cos n$$

$$\int \cos 5n \cos 6n = \frac{1}{2} [\cos(11n) + \cos(n)]$$

$$\int \cos 5n \cos 6n = \frac{1}{2} \left[ \frac{\sin 11n}{11} + \frac{\sin n}{1} \right]$$

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

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NO 5

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

SOLUTION

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

$$A = 7x, B = 2x$$

$$\int \sin 7x \cos 2x = \frac{1}{2} [\sin(9x) + \sin(5x)]$$

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

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