

OLATUNJI ANUOLUWAPU TEMIJOPE MAT 104,
COMPUTER ENGINEERING. 19/ENG 02/080.

Assignment.

① $\int x^{1/2} \ln x \cdot dx$

$$u = \ln x, \quad dv = x^{1/2}$$

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

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

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

dx

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

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

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

$$= \frac{2x^{3/2} \ln x}{3} - \left[\frac{2x^{3/2}}{3 \times 3/2} + C \right]$$

$$= \frac{2x^{3/2} \ln x}{3} - \frac{4x^{3/2}}{9} + C$$

2. $\int 2 \cos 6t \cos t \, dt$

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

Where $A = 6t$, $B = t$.

$$\therefore \cos 6t \cos t = \frac{1}{2} [\cos 7t + \cos 5t]$$

$$\int 2 \cdot \frac{1}{2} [\cos 7t + \cos 5t] dt$$

$$= \int \cos 7t \, dt + \int \cos 5t \, dt$$

$$= \left[\frac{\sin 7t}{7} + \frac{\sin 5t}{5} \right] + C$$

3. $\int \sin^2 x \cos^4 x \, dx$

$$u = \cos x$$

$$\frac{dy}{dx} = -\sin x$$

$$\Rightarrow du = -\sin x dx \quad \Rightarrow dx = \frac{du}{-\sin x}$$

$$\sin^2 x + \cos^2 x = 1$$

$$\therefore \sin^2 x = 1 - \cos^2 x$$

$$= \int \sin x \sin^2 x u^4 \cdot \frac{du}{-\sin x}$$

$$= \int u^4 - \sin^2 x u^4 du$$

$$= -\int u^4 \sin^2 x du$$

$$= -\int (1 - \cos^2 x) u^4 du$$

$$= -\int (1 - u^2) u^4 du$$

$$= \int (u^6 - u^4) du$$

$$= \int u^6 du - \int u^4 du$$

$$= \frac{u^7}{7} - \frac{u^5}{5} + C$$

$$= \frac{(\cos x)^7}{7} - \frac{(\cos x)^5}{5} + C$$