30th April 2020.

MAT 104 Assignment Enokela Okoti Enoch Elect/Elect Engr.

① $\int x^{1/2} \ln x$.

$$\ln \int x^{1/2} \cdot x.$$

$$\ln \int x^{3/2}.$$

Now solving

$$\int x^{3/2}.$$

$$\int ax = \frac{a^{x+1}}{x+1}$$

$$\int x^{3/2} = \frac{2x^{5/2}}{5}$$

Bring all division

$$\ln \cdot \frac{2x^{5/2}}{5}$$

$$\int x^{1/2} \ln x = \frac{2 \ln x^{5/2}}{5} //$$

② $\int 2 \cos 6t \cos t$.

$$2 \int \cos 6t \cos t$$

Now solving

$$\int \cos 6t \cos t.$$

$$\cos(x)\cos(y) = \frac{1}{2}(\cos(y+x) + \cos(y-x)).$$

$$\int \frac{1}{2} \cos 7t + \int \frac{1}{2} \cos 5t.$$

$$\frac{1}{2} \int \cos(7t)\,dt + \frac{1}{2} \int \cos(5t)\,dt.$$

Solving $\int \cos(7t)\,dt$

$$\frac{\sin 7t}{7}$$

Solving $\int \cos(5t)\,dt$

$$\frac{\sin 5t}{5}$$

$$\frac{1}{2}\left(\frac{\sin 7t}{7}\right) + \frac{1}{2}\left(\frac{\sin 5t}{5}\right) + C.$$

$$\frac{\sin 7t}{14} + \frac{\sin 5t}{10} + C.$$

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

$\sin^2(x) = 1 - \cos^2(x)$.

$$= \int -\cos^4(x)\left(\cos^2(x) - 1\right) \cdot \sin(x)\, dx.$$

$u = \cos(x) \rightarrow \frac{du}{dx} = -\sin(x)$.

$dx = -\frac{1}{\sin(x)}\, du$.

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

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

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

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

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