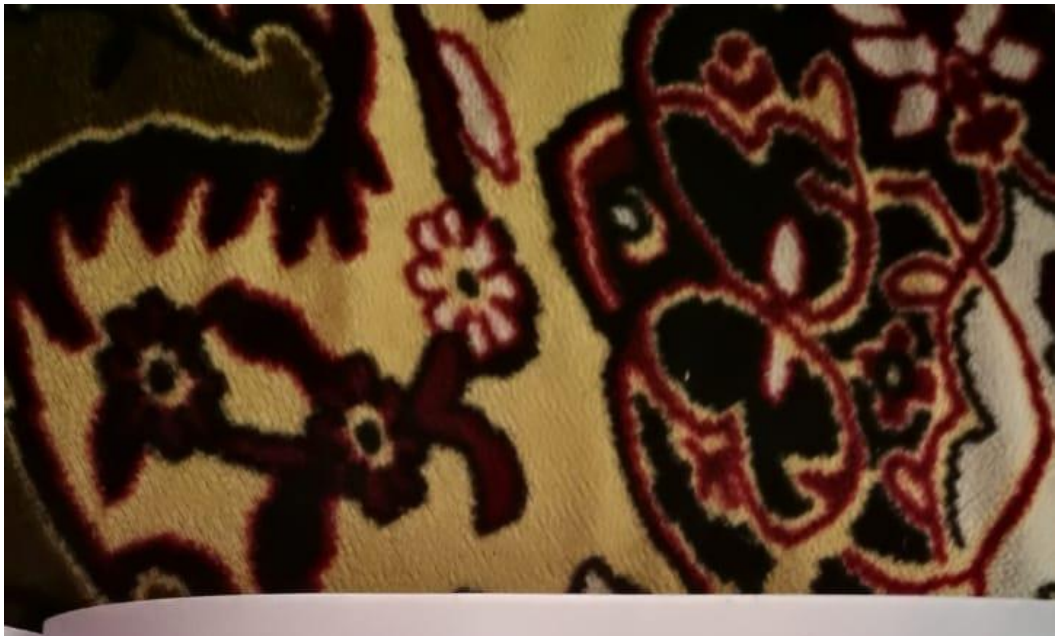

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Subject calculus

Assignment sessional

Submitted to Engr. Himayat Ullah

Q NO 1:-

Ans:- Given:- $\int_0^{\pi/4} (1-\sin t)^{3/2} \cos 2t \, dt$

Solution:-

Integration by parts

$$(1-\sin t)^{3/2}(\cos 2t) = \int (1-\sin t)^{3/2} \cos 2t \int (\cos 2t)\, dt$$

$$= 3/2\left((1-\sin t)^{1/2}\cos t - \frac{\sin 2t}{2}\right)$$

$$\left[(1-\sin t)^{3/2}(\cos 2t)\right]_0^{\pi/4} = \frac{6}{4}\int_0^{\pi/4} (1-\sin t)\cos t \sin^2 t \, dt$$

Now let

$$u = \sin t$$

$$d/dt\, u = \cos t$$

$$du = \cos t \, dt$$

$$(1-\sin t)^{3/2}(\cos 2t) = \frac{6}{4}\int_0^{\pi/4} (1-u)^{1/2} u^2 \, du$$

Now let

$$t = 1-u$$

$$\frac{dt}{du} = -1$$

$$dt = -du$$

$$= 6/4 \int_0^{\pi/4} (1-t)^2 \, t^{1/2} \, -dt$$

$$= -6/4 \int_0^{\pi/4} (1-2t+t^2)(t^{1/2})\, dt$$

applying integral

$$\frac{-6}{4}\int_0^{\pi/4} (t^{1/2} - 2t^{3/2} + t^{5/2})\, dt$$

applying Integral

$$= \frac{-6}{4}\left[\frac{t^{5/2+1}}{\frac{5}{2}+1} - \frac{2t^{3/2+1}}{\frac{3}{2}+1} + \frac{t^{1/2+1}}{1/2+1}\right]_0^{\pi/4}$$

$$= \frac{-6}{4}\left[\left[\frac{2}{7}(t)^{7/2} - \frac{4}{5}t^{5/2} + \frac{2}{3}t^{3/2}\right]\right]_0^{\pi/4}$$

Replace the values

$$= \frac{-6}{4}\left[\frac{2}{7}(\sin t)^{7/2}\Big|_0^{\pi/4} \frac{-4}{5}(\sin t)^{5/4}\Big|_0^{\pi/4} + \frac{2}{3}(\sin t)^{3/2}\Big|_0^{\pi/4}\right.$$

$$= \frac{-6}{4}\left(\frac{2}{7}(\sin 45)^{7/2} - \frac{4}{5}(\sin 45)^{5/4} + \frac{2}{3}(\sin 45)^{3/2}\right.$$

$$= \frac{-6}{4}(0.28 + 0.085 - 0.33)$$

$$= -6/4\ (0.035)$$

$$= 0.0525 \quad \text{Ans.}$$

Q 2:- $\int (4y - y^2 + 4y^3 + 1)^{-2/3} (12y^2 - 2y + 4)\, dy$

Sol:- $\int (4y - y^2 + 4y^3 + 1)^{\frac{-2}{3}} (12y^2 - 2y + 4)\, dy$

By Using Substitution method

let $x = 4y - y^2 + 4y^3 + 1$

$$\frac{dx}{dy} = \frac{d}{dy}(4y - y^2 + 4y^3 + 1)$$

$$= \frac{d}{dy} 4y - \frac{d}{dy} y^2 + \frac{d}{dy} 4y^3 + \frac{d}{dy} 1$$

$$= 4 - 2y + 12y^2$$

$$dx = (4 - 2y + 12y^2)\, dy$$

$$dx = (12y^2 - 2y + 4)\, dy$$

$$\int x^{-2/3}\, dy$$

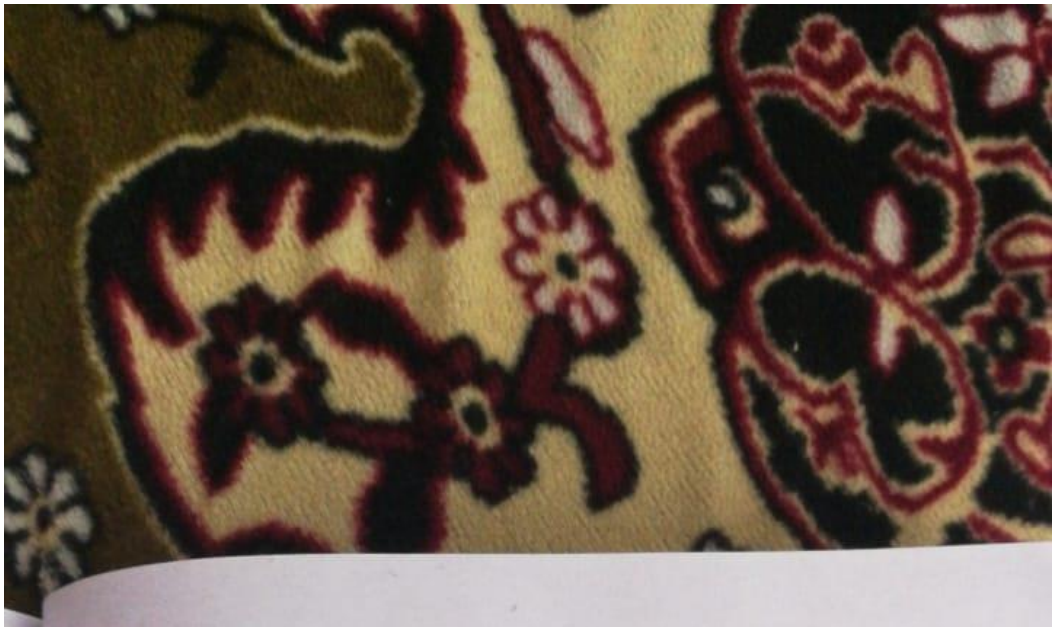
$$\frac{x^{-2/3 + 1}}{-2/3 + 1} + c$$

$$\frac{x^{1/3}}{1/3}$$

$$3x^{1/3} + C$$

NOW put the value of x

$$3(4y - y^2 + 4y^3 + 1)^{1/3} + C$$



Putting the limits

$$\left(3\left(4(1)-(1)^2+4(1)^3+1\right)^{1/3}+c\right.$$

$$3\left(4-1+4+1\right)^{1/3}+c$$

$$3\left(4+4\right)^{1/3}+c$$

$$3\left(8\right)^{1/3}+c$$

$$3\left(2^3\right)^{1/3}$$

$$3\left(2\right)$$

$$6$$