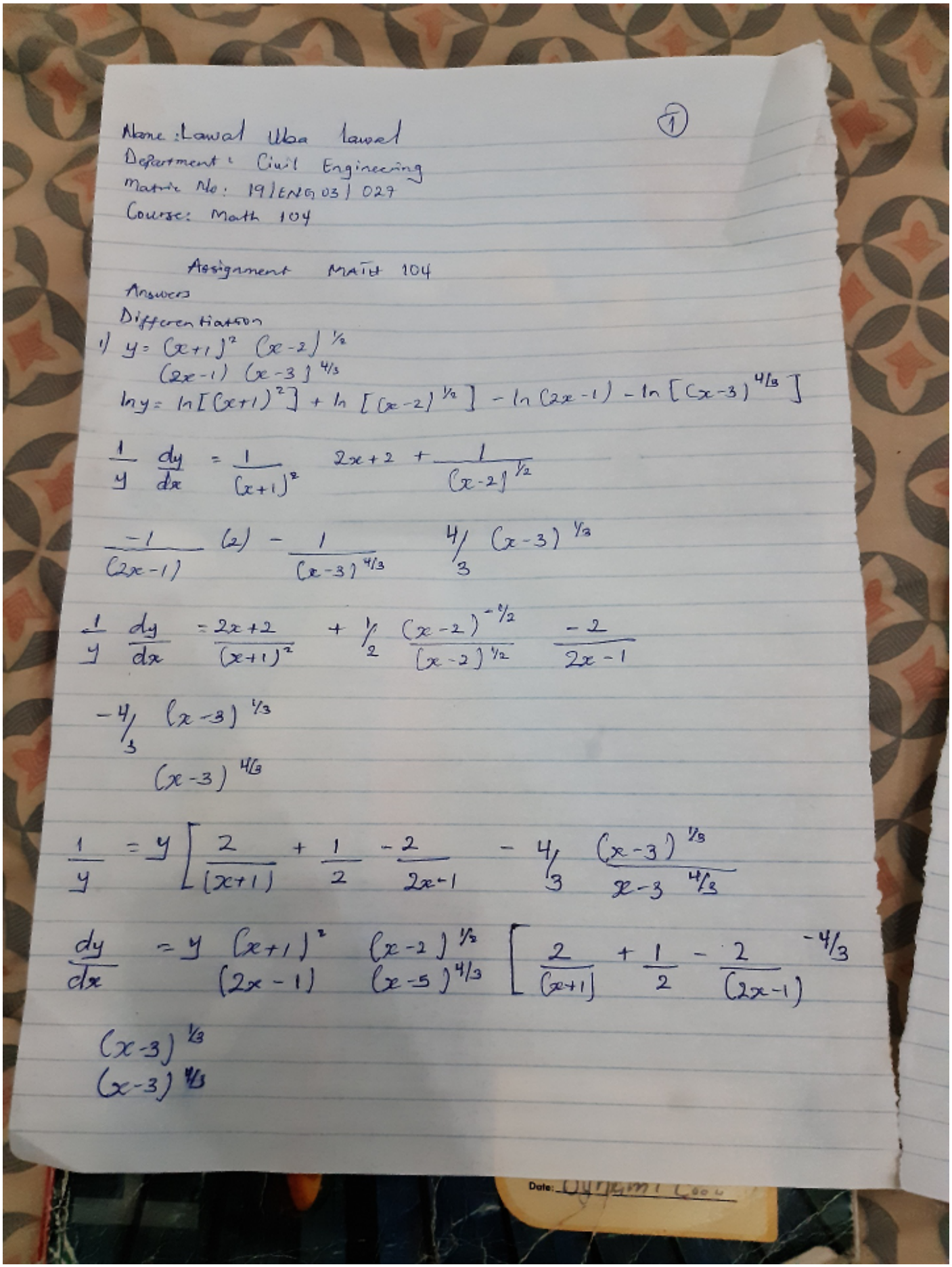
Image



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Course: Math 104

Assignment MATH 104

Answers

Differentiation

1) $y = \frac{(x+1)^2 (x-2)^{1/2}}{(2x-1)(x-3)^{4/3}}$

$\ln y = \ln[(x+1)^2] + \ln[(x-2)^{1/2}] - \ln(2x-1) - \ln[(x-3)^{4/3}]$

$\frac{1}{y}\frac{dy}{dx} = \frac{1}{(x+1)^2} \quad 2x+2 + \frac{1}{(x-2)^{1/2}}$

$\frac{-1}{(2x-1)} \quad (2) \quad -\frac{1}{(x-3)^{4/3}} \quad \frac{4}{3}(x-3)^{1/3}$

$\frac{1}{y}\frac{dy}{dx} = \frac{2x+2}{(x+1)^2} + \frac{1}{2}\frac{(x-2)^{-1/2}}{(x-2)^{1/2}} \quad \frac{-2}{2x-1}$

$-\frac{4}{3}(x-3)^{1/3}$

$(x-3)^{4/3}$

$\frac{1}{y} = y\left[\frac{2}{(x+1)} + \frac{1}{2} - \frac{2}{2x-1} - \frac{4}{3}\frac{(x-3)^{1/3}}{x-3^{4/3}}\right]$

$\frac{dy}{dx} = y\frac{(x+1)^2}{(2x-1)}\frac{(x-2)^{1/2}}{(x-5)^{4/3}}\left[\frac{2}{(x+1)} + \frac{1}{2} - \frac{2}{(2x-1)}\right]^{-4/3}$

$(x-3)^{1/3}$
$(x-3)^{4/3}$

Date:

2/ $y = \frac{3e^k \sin 2k}{k^{5/2}}$

$\ln y = \ln(3e^k) + \ln(\sin 2k) - \ln(k^{5/2})$

$\frac{1}{y}\frac{dy}{dk} = \frac{1}{3e^k} \cdot 3e^k + \frac{1}{\sin 2k} 2\cos 2k - \frac{1}{k^{5/2}} 5k^{5/2}$

$\frac{1}{y}\frac{dy}{dk} = 1 + \frac{2\cos 2k}{\sin 2k} - \frac{5k^{3/2}}{2k^{5/2}}$

$\frac{1}{y}\frac{dy}{dk} = 1 + 2\tan 2k - \frac{5k^{3/2}}{2k^{5/2}}$

$\frac{dy}{dk} = \frac{3e^k \sin 2k}{k^{5/2}} \left[1 + 2\tan 2k - \frac{5k^{3/2}}{2k^{5/2}} \right]$

Integration

1.) $\int 4\sec^2(3m+1)$

let $u = 3m+1$

$\frac{du}{dm} = 3 \quad \angle \; dx = \frac{du}{3}$

$= \int 4\sec^2 u \cdot \frac{du}{3} = \frac{1}{3} \int 4\sec^2 u \cdot du$

$\Rightarrow \frac{1}{3}[4\tan u + c] = \frac{4\tan u}{3} + c$

$\Rightarrow \frac{4\tan(3n+1)}{3} + c$

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

let $u = 3t^2 - 1$

$du = 6t \quad \therefore dt = \frac{du}{6t}$

dt

$\Rightarrow \int 2t\, u^{1/2} \frac{du}{6t} = \int_{3/2} u^{1/2} \frac{du}{3}$

$\frac{1}{3}\int u^{1/2}\,du \Rightarrow \frac{1}{3}\left[\frac{u^{3/2}}{3/2} + c\right]$

$\Rightarrow \frac{2u^{3/2}}{9} + c$

3) $\int \frac{2x}{(4x^2-1)^{1/2}}\,dx$

let $u = 4x^2 - 1$

$du = 8x \quad \therefore dx = \frac{du}{8x}$

dx

$\Rightarrow \int \frac{2x}{u^{1/2}}\,dx = \int \frac{2x}{u^{1/2}} \frac{du}{8x}$

$= \frac{1}{4}\int u^{-1/2}\,du = \frac{1}{4}\left[\frac{u^{1/2}}{1/2} + c\right.$

$= u^{1/2} + c \Rightarrow (4x^2-1)^{1/2} + c$

OR $\frac{\sqrt{(4x^2-1)}}{2} + c$