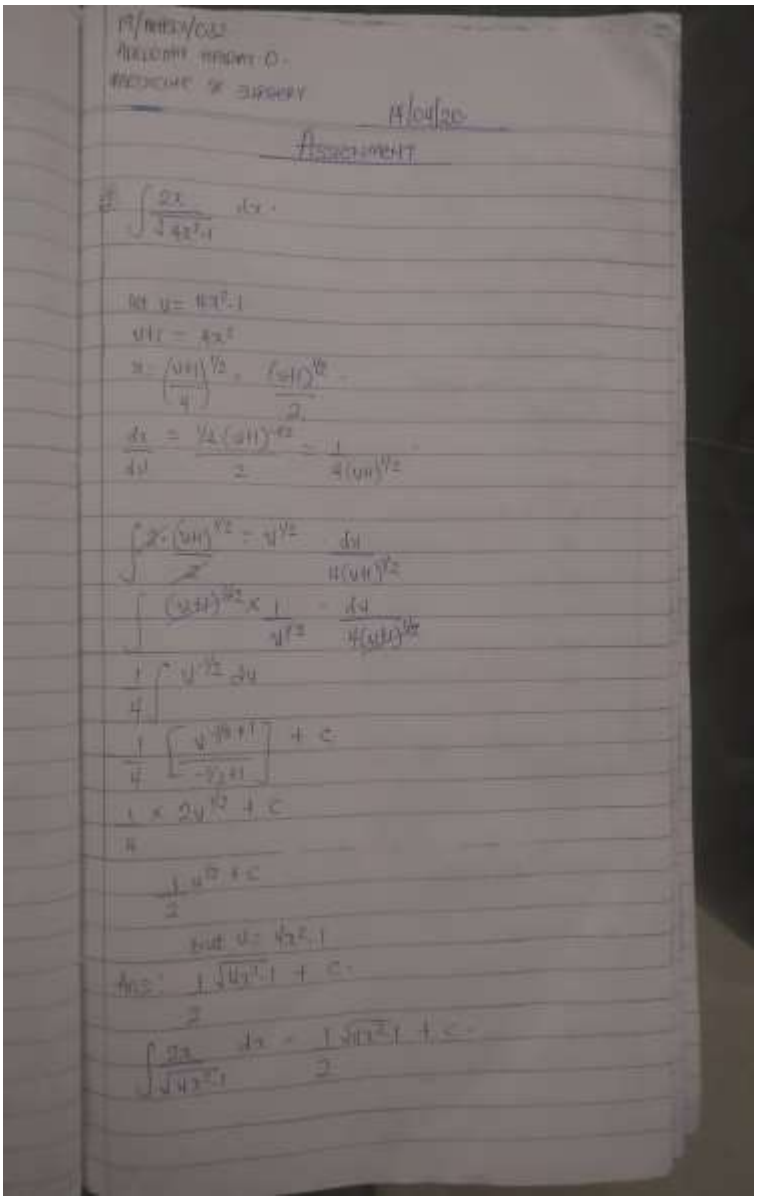


19/08/20

Assignment

Q. $\int \frac{2x}{\sqrt{4x^2+1}}\,dx$.

Put $u = 4x^2+1$

$u+1 = 4x^2$

$x = \frac{(u+1)^{1/2}}{4} = \frac{(u+1)^{1/2}}{2}$

$\frac{dx}{du} = \frac{1/2\,(u+1)^{-1/2}}{2} = \frac{1}{4(u+1)^{1/2}}$

$\int \frac{x\,(u+1)^{1/2}}{x} = u^{1/2}\,\frac{du}{4(u+1)^{1/2}}$

$\int \frac{(u+1)^{1/2}}{1} \times \frac{1}{u^{1/2}} = \frac{du}{4(u+1)^{1/2}}$

$\frac{1}{4}\int u^{-1/2}\,du$

$\frac{1}{4}\left[\frac{u^{-1/2+1}}{-1/2+1}\right] + c$

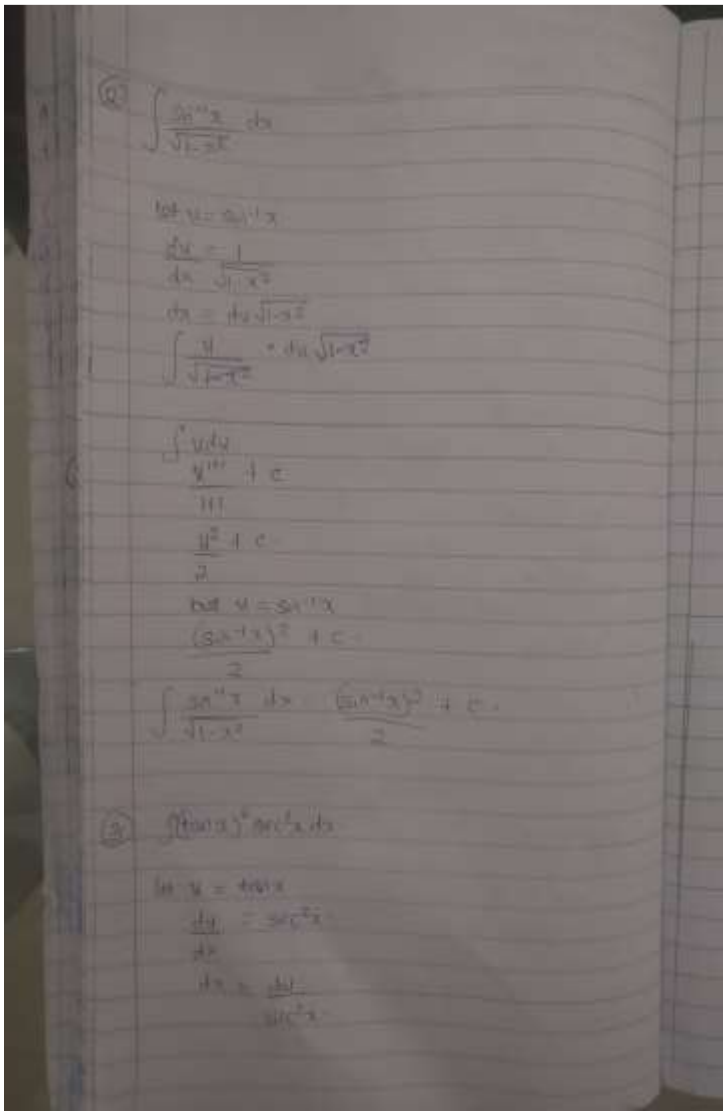
$\frac{1}{4} \times 2u^{1/2} + c$

$\frac{1}{2}u^{1/2} + c$

But $u = 4x^2+1$

Ans: $\frac{1}{2}\sqrt{4x^2+1} + c$.

$\int \frac{2x}{\sqrt{4x^2+1}}\,dx = \frac{1}{2}\sqrt{4x^2+1} + c$.



(2) $\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx$

let $u = \sin^{-1}x$

$\frac{du}{dx} = \frac{1}{\sqrt{1-x^2}}$

$dx = du\sqrt{1-x^2}$

$\int \frac{u}{\sqrt{1-x^2}} \cdot du\sqrt{1-x^2}$

$\int u\,du$

$\frac{u^{1+1}}{1+1} + c$

$\frac{u^2}{2} + c$

but $u = \sin^{-1}x$

$\frac{(\sin^{-1}x)^2}{2} + c$

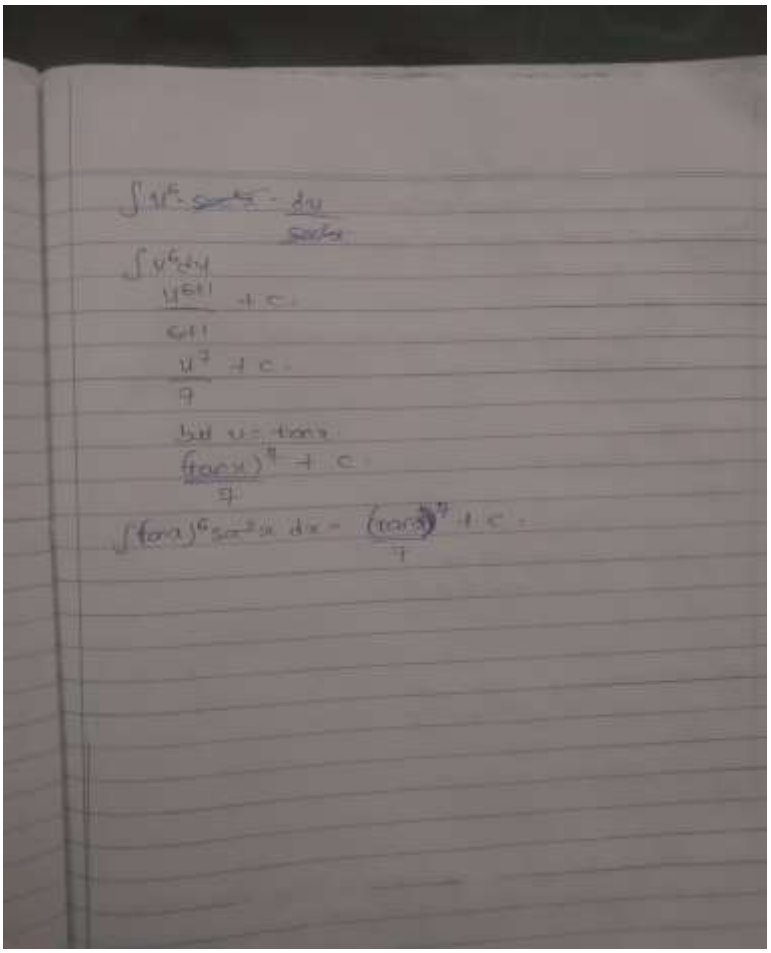
$\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx = \frac{(\sin^{-1}x)^2}{2} + c$

(3) $\int (\tan x)^2 \sec^2 x\,dx$

let $u = \tan x$

$\frac{du}{dx} = \sec^2 x$

$dx = \frac{du}{\sec^2 x}$



$\int u^6 \cdot \sec^2 x \cdot \frac{dx}{\sec^2 x}$

$\int u^6 dx$

$\frac{u^{6+1}}{6+1} + c.$

$\frac{u^7}{7} + c.$

but $u = \tan x$

$\frac{(\tan x)^7}{7} + c.$

$\int (\tan x)^6 \sec^2 x \, dx = \frac{(\tan x)^7}{7} + c.$