Q. $\int\sqrt{4-x^2}\,dx = \int\sqrt{(2)^2-(x)^2}\,dx$

$-\frac{9}{4}-1 = -\frac{13}{4}$

$+\frac{13}{4} = \left(\frac{\sqrt{13}}{2}\right)^2$

$\int\sqrt{(2)^2-x^2} = \frac{x}{2}\sqrt{(2)^2-(x)^2} + \frac{4}{\cancel{2}}\cancel{2}\sin^{-1}\frac{x}{2} + c$ Ans

Q. $\int\sqrt{x^2+4x+6}\,dx = \int\sqrt{(x)^2+2\times x\times 2+(2)^2-(2)^2+6}\,dx$

$\rightarrow \int\sqrt{(x+2)^2+(\sqrt{2})^2}\,dx = \frac{x+2}{2}\sqrt{x^2+4x+6} + \frac{\cancel{2}}{\cancel{2}}\log\left|\,|x+2|+\sqrt{x^2+4x+6}\,\right|+C$ Ans

Q. $\int\sqrt{1+3x-x^2}\,dx = \int\sqrt{-(x^2-3x-1)}\,dx = \int\sqrt{-\left[(x)^2-2\times x\times\frac{3}{2}+\left(\frac{3}{2}\right)^2-\left(\frac{3}{2}\right)^2-1\right]}\,dx$

$\Rightarrow \int\sqrt{\left(\frac{\sqrt{13}}{2}\right)^2-\left(x-\frac{3}{2}\right)^2} \Rightarrow \frac{2x-3}{2\cdot 2}\sqrt{1+3x-x^2} + \frac{13}{4\cdot 2}\sin^{-1}\left(\frac{2x-3}{\cancel{2}\cdot\sqrt{13}}\times\cancel{2}\right)+C$

$=$

H.W

1. $\int \sqrt{1-4x^2}\,.\,dx$ $\qquad (2x)^2 \rightarrow t$

2. $\int \sqrt{x^2+4x-5}\,.\,dx$

3. $\int \sqrt{x^2+3x}\,.\,dx$

Q. $\int \sqrt{1+\frac{x^2}{9}}\,dx = \int \sqrt{\frac{9+x^2}{9}}\,dx = \frac{1}{3}\int \sqrt{(3)^2+(x)^2}\,dx$

Q. $\int \sqrt{x^2-8x+7}\,dx = \int \sqrt{(x)^2-2\times x\times(4)+(4)^2-(4)^2+7}\,dx$

$\rightarrow \int \sqrt{(x-4)^2-(3)^2}\,dx = \frac{x-4}{2}\sqrt{x^2-8x+7}-\frac{9}{2}\log\left|x-4+\sqrt{x^2-8x+7}\right|+C$

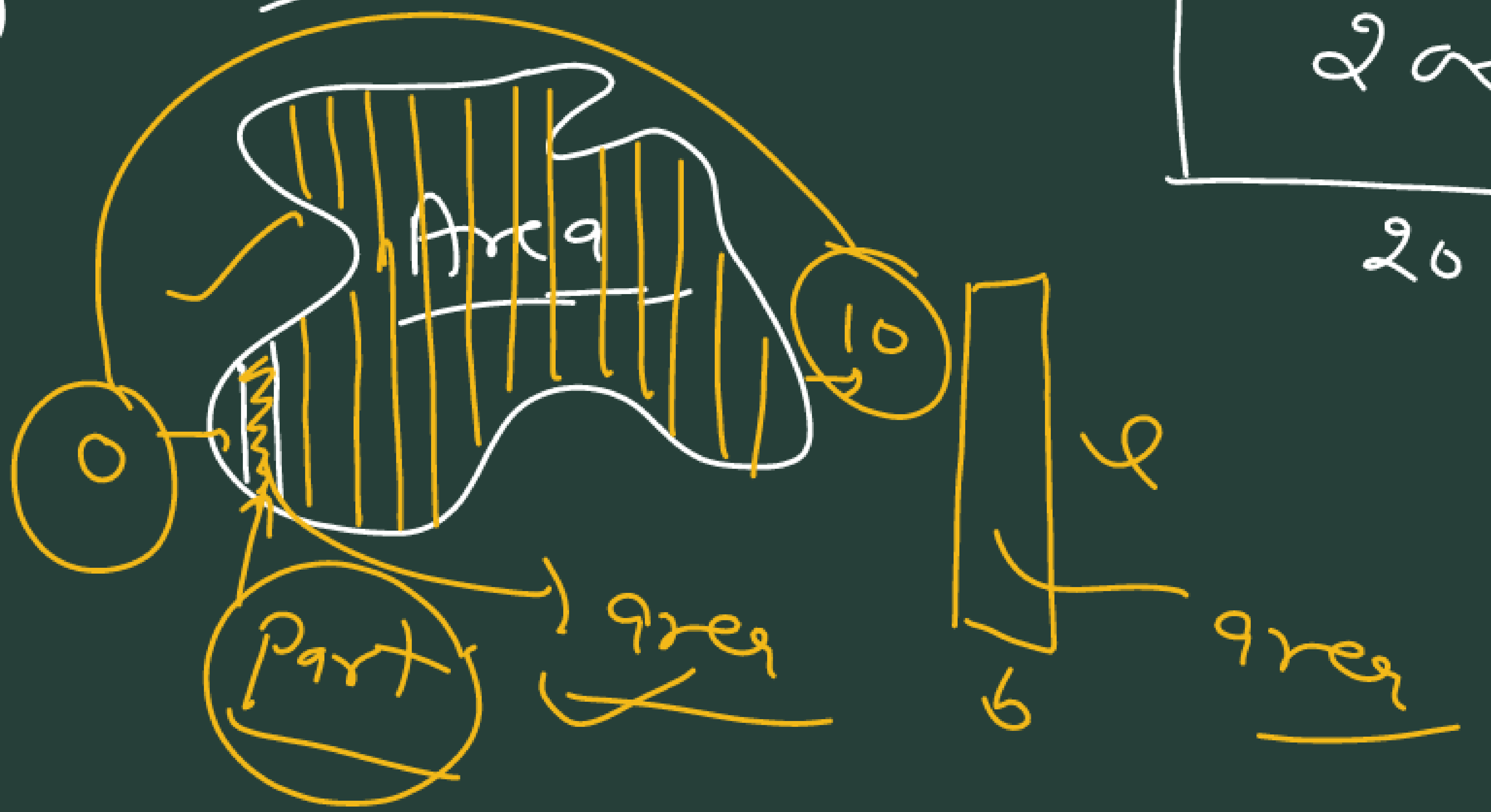
InDefinate Integration $\int x \cdot dx \rightarrow \frac{x^2}{2} + C$

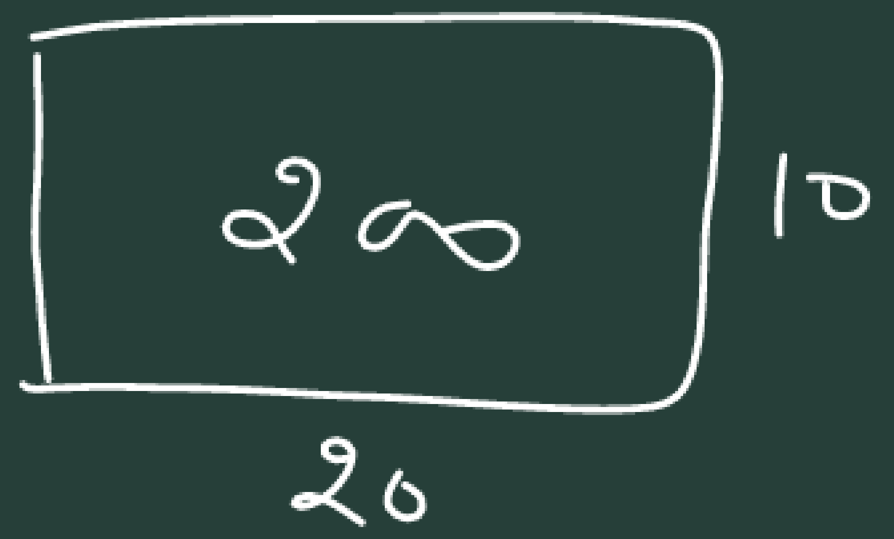
$C \rightarrow$ Constant

Definate Integration

$$\int_{-2}^{4} x \cdot dx$$

Integration





Q. $\int_{-1}^{1} (x+1) \cdot dx = \int_{-1}^{1} x \cdot dx + \int_{-1}^{1} 1 \cdot dx = \left[\frac{x^2}{2}\right]_{-1}^{1} + [x]_{-1}^{1}$

$I = \left[\cancel{\frac{1}{2}} - \cancel{\frac{1}{2}}\right] + [1-(-1)] = 2$ Ans

$$\begin{array}{r} 99 \\ 35 \\ \hline 64 \end{array}$$

Q $\int_{1}^{2} (4x^3 - 5x^2 + 6x + 9) \cdot dx$

$\Rightarrow \int_{1}^{2} 4x^3 \cdot dx - \int_{1}^{2} 5x^2 \cdot dx + \int_{1}^{2} 6x \cdot dx + \int_{1}^{2} 9 \cdot dx$

$\Rightarrow 4\left[\frac{x^4}{4}\right]_1^2 - 5\left[\frac{x^3}{3}\right]_1^2 + 6\left[\frac{x^2}{2}\right]_1^2 + 9[x]_1^2$

$\Rightarrow \cancel{\frac{4}{4}}[16-1] - \frac{5}{3}[8-1] + \frac{6}{2}[4-1] + 9[2-1]$

$\Rightarrow 15 - \frac{5 \times 7}{3} + 3 \times 3 + 9 = 33 - \frac{35}{3} = \frac{64}{3}$ Ans

H.W

Q $\int_{2}^{3} \frac{1}{x} \cdot dx$

Q $\int_{0}^{\pi/4} \sin 2x \cdot dx$

Q. $\int_{4}^{5} e^{x} \cdot dx$

a. $\int_0^{\pi/2} \cos 2x \, dx = \left[\frac{\sin 2x}{2}\right]_0^{\pi/2} = \frac{1}{2}\left[\sin \pi - \sin 0\right]$

$= \frac{1}{2}\left[0 - 0\right] = 0$

a $\int_{\pi/6}^{\pi/4} \operatorname{cosec} x \, dx = \left[\log\left|\operatorname{cosec} x - \cot x\right|\right]_{\pi/6}^{\pi/4}$

$= \log\left|\left(\operatorname{cosec}\frac{\pi}{4} - \cot\frac{\pi}{4}\right)\right| - \log\left|\operatorname{cosec}\frac{\pi}{6} - \cot\frac{\pi}{6}\right|$

$= \log\left|\sqrt{2} - 1\right| - \log\left|2 - \sqrt{3}\right|$

$\Rightarrow \log\left|\frac{\sqrt{2}-1}{2-\sqrt{3}}\right|$ Ans

Q. $\displaystyle\int_0^1 \frac{dx}{\sqrt{1-x^2}} = \left[\sin^{-1}x\right]_0^1 = \left[\sin^{-1}(1) - \sin^{-1}(0)\right]$

$= \left[\cancel{\sin^{-1}}\,\cancel{\sin}(\pi/2) - \cancel{\sin^{-1}}\cdot\cancel{\sin}(0)\right] = \pi/2$ Ans

Q. $\displaystyle\int_2^3 \frac{dx}{(x)^2-(1)^2}$ $\left\{ \because \displaystyle\int \frac{1}{x^2-(a)^2} = \frac{1}{2a}\log\left|\frac{x-a}{x+a}\right| \right.$

$\Rightarrow \left[\dfrac{1}{2\cdot 1}\log\left|\dfrac{x-1}{x+1}\right|\right]_2^3 = \dfrac{1}{2}\left[\log\left|\dfrac{x-1}{x+1}\right|\right]_2^3 = \dfrac{1}{2}\left[\log\left|\dfrac{2}{4}\right| - \log\left|\dfrac{1}{3}\right|\right]$

$\rightarrow \dfrac{1}{2}\left[\log\left|\dfrac{1/2}{1/3}\right|\right] \Rightarrow \dfrac{1}{2}\log\left|\dfrac{3}{2}\right|$ Ans

H.W.

(i) $\int_0^{\pi/2} \cos^2 x \cdot dx = \int_0^{\pi/2} \left[\frac{1+\cos 2x}{2}\right] \cdot dx = \frac{1}{2}\left[\int_0^{\pi/2} 1 \cdot dx + \int_0^{\pi/2} \cos 2x \, dx\right]$

(ii) $\int_0^1 \frac{2x+3}{5x^2+1} dx = \underbrace{\int_0^1 \frac{2x}{5x^2+1} \cdot dx}_{I_1} + \underbrace{\int_0^1 \frac{3}{5x^2+1} \cdot dx}_{I_2}$

$\boxed{\frac{1}{x^2+a^2}}$

$I_1 \Rightarrow$ let $\rightarrow 5x^2+1 = t$

$2 \times 5x \, dx = dt$

$\Rightarrow I_1 = \int_0^1 \frac{dt/5}{t}$

$I_1 = \frac{1}{5}\left[\log|t|\right]_0^1$

$= \frac{1}{5}\left[\log|5x^2+1|\right]_0^1$

$I_1 = \frac{1}{5}\left[\log|6| - \log|1|\right] = \boxed{\frac{1}{5}\log|6| = I_1}$

$\therefore I_2 = \frac{3}{5}\int_0^1 \frac{1}{x^2+1/5} \cdot dx = \frac{3}{5}\int_0^1 \frac{1}{(x)^2+\left(\frac{1}{\sqrt{5}}\right)^2} dx$

$I_2 = \frac{3}{5}\left[\frac{1}{1/\sqrt{5}} \times \tan^{-1}\left(\frac{x}{1/\sqrt{5}}\right)\right]_0^1 = \frac{3}{5} \times \sqrt{5} \cdot \left[\tan^{-1}(\sqrt{5}) - \tan^{-1}(0)\right]$

$I_2 = \frac{3}{\sqrt{5}} \tan^{-1}(\sqrt{5})$

H.W

Q $\int_{2}^{3} \frac{x}{x^2+1} dx.$

Q. $\int_{0}^{1} x \cdot e^{x^2} \cdot dx$

Q. $\int_{0}^{\pi/4} (2\sec^2 x + x^3 - 2) \cdot dx$