Ex: $\int_{-1}^{1} 3x^2\sqrt{x^3+1}\,dx$

WE NEED u-SUB!

$u = x^3+1$

$\frac{du}{3x^2} = \cancel{3x^2}\,dx$

$\int_0^2 \cancel{3x^2}\, u^{1/2}\cdot\frac{du}{\cancel{3x^2}}$

CHANGE LIMITS:

$u = x^3+1 \Rightarrow$ AT $x=1 \Rightarrow \boxed{u=2}$

$u = x^3+1 \Rightarrow$ AT $x=-1 \Rightarrow \boxed{u=0}$

$\int_0^2 u^{1/2}\,du$

$\frac{2}{3}u^{3/2}\Big]_0^2$

$\frac{2}{3}\left[2^{3/2}-0\right] = \boxed{\frac{2}{3}(2\sqrt{2})}$

$\cancel{\int_0^1 (2x-3)^5\,dx}$

$u = 2x-3$

$\frac{du}{2} = x\,dx$

$x=0 \Rightarrow u=-3$

$x=1 \Rightarrow u=-1$

$\int_{-3}^{-1} u^5\,\frac{du}{2}$

$\frac{1}{2}\int_{-3}^{-1} u^5\,du$

$\frac{1}{12}u^6\Big]_{-3}^{-1} = \frac{1}{12}\left((-1)^6-(-3)^6\right)$

$= \frac{1}{12}(1-729) = \boxed{\frac{-182}{3}}$

$\int_0^{\pi/6} \cos^4 3x\,\cancel{\sin 3x}\,dx$

$u = \cos 3x$

$du = -\cancel{3\sin 3x}\,dx$

$x=0 \Rightarrow u=\cos 0 = 1$

$x=\pi/6 \Rightarrow u=\cos\pi/2 = 0$

$-\frac{1}{3}\int_1^0 u^4\,du$

$\frac{1}{3}\int_0^1 u^4\,du$

$\frac{1}{15}u^5\Big]_0^1 = \boxed{\frac{1}{15}}$

$\int_{\pi/4}^{\pi/2} \cot\cancel{x}\,\csc^2\cancel{x}\,d\cancel{x}$

$u = \cot\theta$

$-du = +\cancel{\csc^2\theta}\,d\theta$

$x=\pi/4 \Rightarrow u=\cot\pi/4 = 1$

$x=\pi/2 \Rightarrow u=\cot\pi/2 = 0$

$-\int_1^0 u\,du$

$\int_0^1 u\,du$

$\frac{1}{2}u^2\Big]_0^1 = \boxed{1/2}$