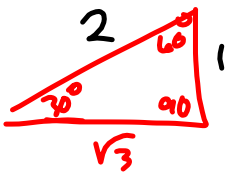
$$\int_0^2 u^4\,du = \frac{u^5}{5}\Big]_0^2 = \frac{32}{5}$$?



$$\int_{0=x}^{\frac{\pi}{6}=x} \cos^4 x \sin x\,dx = \int_{x=0}^{x=\frac{\pi}{6}} u^4 \sin x \left(\frac{du}{-\sin x}\right)$$

$u = \cos x$

$\frac{du}{dx} = -\sin x$

$du = -\sin x\,dx \Rightarrow$

$\frac{du}{-\sin x} = dx$

$x = 0 \Rightarrow$

$u = \cos(0) = 1$

$x = \frac{\pi}{6} \Rightarrow$

$u = \cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$

$$= -\int_{1=u}^{\frac{\sqrt{3}}{2}=u} u^4\,du$$

$$= -\left[\frac{u^5}{5}\right]_{1=u}^{\frac{\sqrt{3}}{2}=u}$$

$$= -\left[\frac{\cos^5 x}{5}\right]_0^{\frac{\pi}{6}}$$

$$\int_0^{\frac{\pi}{4}} \cos^4 x \sin x \, dx = -\int_0^{\frac{\pi}{4}} u^4 \, du = -\left[\frac{\left(\frac{\pi}{4}\right)^5}{5} - \frac{0^5}{5}\right]$$

is Bad

$$-\left[\frac{\left(\frac{\sqrt{3}}{2}\right)^5}{5} - \frac{1^5}{5}\right]$$

is correct.

$$\int \cos(3x)\,dx = \int \cos u \cdot \frac{du}{3} = \frac{1}{3}\int \cos u\,du =$$

$u = 3x \Rightarrow du = 3dx \Rightarrow dx = \frac{du}{3}$

$$\int \cos u\,du = \sin u + C$$

$$\frac{1}{3}\sin(3x) = \frac{1}{3}\sin u + C$$

Trick: Do $\int f(x)dx$ before $\int_a^b f(x)dx$

$$\int \sin^5 x \, dx$$

$(1-x)^2 = (x-1)^2$

$u = \sin x$

$du = \cos x \, dx$ They ain't no $\cos x$ in there.

Want some sort of $u^n du$ thingie.

Hint: $\sin^5 x = \sin^4 x \sin x$

$= (\sin^2 x)^2 \sin x$

$$\int \sin^5 x\,dx = \int \sin^4 x \sin x\,dx$$

$$= \int (1-\cos^2 x)^2 \sin x\,dx$$

$$= -\int (\cos^4 x - 2\cos^2 x + 1)(-\sin x)\,dx$$

$$= -\int \cos^4 x(-\sin x)\,dx + 2\int \cos^2 x(-\sin x)\,dx + \int \sin x\,dx$$

$$= -\frac{\cos^5 x}{5} + \frac{2\cos^3 x}{3} - \cos x + C$$

$\cos^4 x$

$u = \cos x$

$du = -\sin x\,dx$

$\int \cos x \, dx = \sin x + C$ CAKE

$\int \cos(5x^3 - 7x) \, dx$ TOUGH Ouch!

$\int \cos(5x^3 - 7x)(15x^2 - 7) \, dx$ CAKE

$= \sin(5x^3 - 7x) + C$

or $u = 5x^3 - 7x$

$du = (15x^2 - 7)dx$

Review Differentials