Techniques of Integration Review

int by parts

$\int u\,dv = uv - \int v\,du$

$\int x^3 \ln x$

$u =$ $\quad dv =$

$du =$ $\quad v =$ integ.

$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$

2(a) $\int \sqrt{9 + x^2}\,dx \quad x = 3\tan\theta$

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3) $u = \sin^{-1} x \quad dv = dx$

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

4) $\int \sin 4x \cos 8x\,dx$

Sum & product identity

$$\int \sin^2 x \cos^3 x \, dx$$

$$\int \sin^2 x \cdot \cos^2 x \cos x \, dx$$

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

$$\int \left(\sin^2 x - \sin^4 x\right) \cos x \, dx$$

$u = \sin x$

$$\int \sin^4 x \cos^2 x \, dx$$

$$\int \left(\sin^2 x\right)^2 \cos^2 x \, dx$$

$$\int \left[\frac{1}{2}\left(1 - \cos 2x\right)\right]^2 \left[\frac{1}{2}\left(1 + \cos 2x\right)\right] dx$$

$$\frac{1}{8}\int \left(1 - \cos 2x\right)\left(1 - \cos 2x\right)\left(1 + \cos 2x\right)$$

FOIL

$$\int \left(1 - \cos^2 x\right)\left(1 - \cos^2 2x\right)$$

$$\left(1 - \cos 2x\right)\sin^2 2x$$

Distribute, Split to 2 integ.

$$\sin^2 2x = \frac{1}{2}\left(1 - \cos 4x\right)$$