C12 - 5.10 - Trig Int Notes

$\int cos2x\,dx = \frac{sin2x}{2} + C$

Think: What would you have to divide by to reverse chain rule?

Reverse Chain

$\int sin2x\,dx = -\frac{cos2x}{2} + C$

$\int cos2x\,dx = \int cosu\frac{du}{2}$

$= \frac{1}{2}\int cosudu$

$= \frac{1}{2}sinu + C$

$= \frac{1}{2}sin2x + C$

$u = 2x$

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

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

$\int \sin^2 x\,dx =$

$\int \frac{1 - cos2x}{2}dx$

$\frac{1}{2}\int (1 - cos2x)\,dx$

$\frac{1}{2}\left(x - \frac{sin2x}{2}\right) + C$

$cos2x = 1 - 2\sin^2 x$

$\sin^2 x = \frac{1 - cos2x}{2}$

$cos2x = 2\cos^2 x - 1$

$\cos^2 x = \frac{1 + cos2x}{2}$

$\int \cos^2 x\,dx =$

$\int \frac{1 + cos2x}{2}dx$

$\frac{1}{2}\int (1 + cos2x)\,dx$

$\frac{1}{2}\left(x - \frac{sin2x}{2}\right) + C$

$\int \sin^2 x\,cosxdx$

$\int u^2 cosx\frac{du}{cosx}$

$\int u^2 du$

$\frac{u^3}{3} + C$

$\frac{\sin^3 x}{3} + C$

$u = sinx$

$\frac{du}{dx} = cosx$

$dx = \frac{du}{cosx}$

$\int \cos^3 x\,dx =$

$\int \cos^2 xcosx\,dx =$

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

$\int (cosx - \sin^2 xcosx)dx =$

$-sinx - \frac{\sin^3 x}{3} + C$

$\int \frac{\cos^2 x}{\sin^2 x}dx$

$\int \csc^2 x - 1\,dx$

$-cotx - x + C$

$\frac{\cos^2 x}{\sin^2 x}$

$\frac{1 - \sin^2 x}{\sin^2 x}$

$\frac{1}{\sin^2 x} - \frac{\sin^2 x}{\sin^2 x}$

$\csc^2 x - 1$

$cos^2 x = 1 - \sin^2 x$

$\int \frac{1}{1 + sinx}dx$

$\int (\sec^2 x - secxtanx)\,dx$

$tanx - secx + C$

$\frac{1}{1 + sinx}$

Conjugate

$\frac{1}{1 + sinx} \times \frac{1 - sinx}{1 - sinx}$

$\frac{1 - sinx}{1 - \sin^2 x}$

$\frac{1 - sinx}{\cos^2 x}$

Separate Fractions

$\frac{1}{\cos^2 x} - \frac{sinx}{\cos^2 x}$

$\sec^2 x - secxtanx$

$\frac{sinx}{\cos^2 x}$

$\frac{sinx}{cosx} \times \frac{1}{cosx}$

$tanxsecx$

$\frac{ab}{bc} = \frac{a}{b} \times \frac{b}{c}$

$\int \frac{secx}{\tan^2 x}dx$

$\int \frac{cosx}{\sin^2 x}dx$

$\int \frac{cosx}{u^2}\frac{du}{cosx}$

$\int \frac{1}{u^2}du$

$\int u^{-2}du$

$\frac{u^{-1}}{-1} + C$

$-\frac{1}{u} + C$

$-\frac{1}{sinx} + C$

$-cscx + C$

$\frac{\frac{1}{cosx}}{\frac{\sin^2 x}{\cos^2 x}}$

Trig Identities

$\frac{1}{cosx} \times \frac{\cos^2 x}{\sin^2 x}$

$u = sinx$

$\frac{du}{dx} = cosx$

$dx = \frac{du}{cosx}$

$\int cos^4 x\,dx$

$\int (cos^2 x)^2\,dx$

$\int \left(\frac{1 + cos2x}{2}\right)^2 dx$

$\frac{1}{4}\int (cos2x + 1)(cos2x + 1)\,dx$

$\frac{1}{4}\int (\cos^2 2x + 2cos2x + 1)\,dx$

$\frac{1}{4}\left(\frac{1}{2}\left(x + \frac{sin4x}{4}\right) + sin2x + x\right) + C$

$\frac{3x}{8} + \frac{sin4x}{32} + \frac{sin2x}{4} + C$

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

$\int \frac{1 + cos4x}{2}dx$

$\frac{1}{2}\left(\int 1 + cos4x\,dx\right)$

$\frac{1}{2}\left(x + \frac{sin4x}{4}\right)$