

Lecture 27

Thursday, March 2, 2023 3:53 PM

* Questions...

Trigonometric substitution

* Identities to remember

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

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

$$3) \quad \int \sin(ax+b) dx = -\frac{\cos(ax+b)}{a} + C$$

$$4) \quad \int \cos(ax+b) dx = \frac{\sin(ax+b)}{a} + C$$

$$\begin{aligned} \underline{\underline{\text{Ex}}} \quad \int_0^{\pi} \sin^2 x dx &= \int_0^{\pi} \frac{1 - \cos 2x}{2} dx = \int_0^{\pi} \left(\frac{1}{2} - \frac{\cos 2x}{2} \right) dx \\ &= \left(\frac{x}{2} - \frac{\sin 2x}{4} \right) \Big|_0^{\pi} \\ &= \frac{\pi}{2} \end{aligned}$$

$$\underline{\underline{\text{Ex}}} \quad \int_0^{\pi/2} \sin^2 x \cos x dx = \int_0^1 u^2 \cos x \frac{du}{\cos x} = \int_0^1 u^2 du = \frac{u^3}{3} \Big|_0^1 = \frac{1}{3}$$

$$u = \sin x$$

$$du = \cos x dx$$

$$dx = \frac{du}{\cos x}$$

x	0	$\pi/2$
u	0	1