

7.2.1

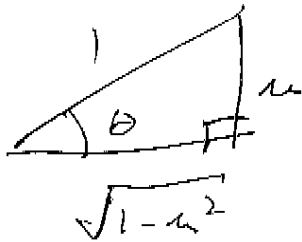
Example 1: Use Trig Substitution (from 7.3) to find  $\int 2x\sqrt{1-x^4} dx$

$$u = x^2$$

$$du = 2x dx$$

$$\int 2x\sqrt{1-x^4} dx = \int \sqrt{1-u^2} du$$

$$\begin{aligned} u = \sin \theta &= \int \sqrt{1-\sin^2 \theta} \cdot \cos \theta d\theta \\ du = \cos \theta d\theta \end{aligned}$$



$$= \int \cos^2 \theta d\theta$$

$$= \int \frac{1 + \cos 2\theta}{2} d\theta$$

$$= \frac{1}{2} \theta + \frac{\sin 2\theta}{4} + C$$

$$= \frac{1}{2} \theta + \frac{\sin \theta \cos \theta}{2} + C$$

$$= \frac{1}{2} \arcsin(u) + \frac{u \sqrt{1-u^2}}{2} + C$$

$$= \frac{1}{2} \arcsin(x^2) + \frac{x^2 \sqrt{1-x^4}}{2} + C$$