

**Disk Method:**  $V = \int_a^b \pi [R(x)]^2 dx$       **Washer Method:**  $V = \int_a^b \pi ([R(x)]^2 - [r(x)]^2) dx$

**Shell Method:**  $V = \int_a^b 2\pi r(x)h(x) dx$       **Surface Area:**  $S = \int_a^b 2\pi f(x)\sqrt{1+(f'(x))^2} dx$

**Arc Length Formula:**  $L = \int_a^b \sqrt{1+(f'(x))^2} dx$

**Useful Trigonometric Identities:**  $\cos^2 \theta = \frac{1+\cos 2\theta}{2}$ ;  $\sin^2 \theta = \frac{1-\cos 2\theta}{2}$ ;  $\sin 2\theta = 2 \sin \theta \cos \theta$

$$\sin \alpha \cos \beta = \frac{1}{2}(\sin(\alpha - \beta) + \sin(\alpha + \beta)); \quad \sin \alpha \sin \beta = \frac{1}{2}(\cos(\alpha - \beta) - \cos(\alpha + \beta))$$

$$\cos \alpha \cos \beta = \frac{1}{2}(\cos(\alpha - \beta) + \cos(\alpha + \beta))$$