

These are elementary identities that *should not* need much memorization or looking up. Only (1), (17), (18) should be “memorized.” The rest should be understood, not memorized.

Notation:  $s_X = \sin X$ ,  $s = s_\alpha$ ,  $s_2 = s_{2\alpha}$ ,  $c_X = \cos X$ , etc.

$$e^{i\alpha} = c_\alpha + is_\alpha \quad (1)$$

$$s_\alpha = \frac{e^{i\alpha} - e^{-i\alpha}}{2i} \quad (2)$$

$$c_\alpha = \frac{e^{i\alpha} + e^{-i\alpha}}{2} \quad (3)$$

$$s_{0^\circ} = 0 \quad (4)$$

$$s_{\pi/6} = s_{30^\circ} = 1/2 \quad (5)$$

$$s_{\pi/4} = s_{45^\circ} = \sqrt{2}/2 \quad (6)$$

$$s_{\pi/3} = s_{60^\circ} = \sqrt{3}/2 \quad (7)$$

$$s_{\pi/2} = s_{90^\circ} = 1 \quad (8)$$

$$c_{0^\circ} = 1 \quad (9)$$

$$c_{\pi/6} = c_{30^\circ} = \sqrt{3}/2 \quad (10)$$

$$c_{\pi/4} = c_{45^\circ} = \sqrt{2}/2 \quad (11)$$

$$c_{\pi/3} = c_{60^\circ} = 1/2 \quad (12)$$

$$c_{\pi/2} = c_{90^\circ} = 0 \quad (13)$$

$$s^2 + c^2 = 1 \quad (14)$$

$$\tan^2 + 1 = \sec^2 \quad (15)$$

$$1 + \cot^2 = \csc^2 \quad (16)$$

$$s_{\alpha \pm \beta} = s_\alpha c_\beta \pm c_\alpha s_\beta \quad (17)$$

$$c_{\alpha \pm \beta} = c_\alpha c_\beta \mp s_\alpha s_\beta \quad (18)$$

$$s^2 = \frac{1 - c_2}{2} \quad (19)$$

$$c^2 = \frac{1 + c_2}{2} \quad (20)$$

$$s c = \frac{s_2}{2} \quad (21)$$

$$s_\alpha c_\beta = \frac{s_{\alpha+\beta} + s_{\alpha-\beta}}{2} \quad (22)$$

$$c_\alpha s_\beta = \frac{s_{\alpha+\beta} - s_{\alpha-\beta}}{2} \quad (23)$$

$$c_\alpha c_\beta = \frac{c_{\alpha+\beta} + c_{\alpha-\beta}}{2} \quad (24)$$

$$s_\alpha s_\beta = \frac{-c_{\alpha+\beta} + c_{\alpha-\beta}}{2} \quad (25)$$