**Trigonometric Identities**

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| $e^{\pm jx} = \cos\ x\ \pm\ j\ \sin\ x$ |
| $\cos\ x = \frac{1}{2}\left[e^{jx} + e^{-jx}\right]$ |
| $\sin\ x = \frac{1}{2j}\left[e^{jx} - e^{-jx}\right]$ |
| $sin^2\ x + cos^2\ x\ =\ 1$ |
| $cos^2\ x - sin^2\ x\ =\ \cos\ 2x$ |
| $cos^2 x = \frac{1}{2}(1 + \cos\ 2x)$ |
| $sin^2 x = \frac{1}{2}(1 - \cos\ 2x)$ |
| $cos^3\ x = \frac{1}{4}(3\ \cos\ x + \cos\ 3x)$ |
| $\sin(x\ \pm\ y) = \sin\ x\ \cos\ y \pm\ \cos\ x\ \sin\ y$ |
| $\cos\ (x \pm\ y) =\ \cos\ x\ \cos\ y \mp\ \sin\ x\ \sin\ y$ |
| $\tan\ (x \pm\ y) = \frac{\tan\ x \pm\ \tan\ y}{1 \mp\ \tan\ x\ \tan\ y}$ |
| $\sin\ x\ \sin\ y\ =\ \frac{1}{2}\ [\cos(x\ -\ y) - \cos(x + y)]$ |
| $\cos\ x\ \cos\ y\ =\ \frac{1}{2}\ [\cos(x - y) + \cos(x + y)]$ |
| $\sin x\ \cos\ y\ = \frac{1}{2}\ [\sin(x - y) + \sin(x + y)]$ |
| A $\cos\ x\ +$ B $\sin\ x =$ C $\cos(x + \theta)$<br>where C $= \sqrt{A^2 + B^2}$ and $\theta = -tan^{-1}\frac{B}{A}$ |