

1. Trig Addition, Half Angle.

$$\cos(A \pm B) = \cos(A)\cos(B) \mp \sin(A)\sin(B)$$

$$\cos(2A) = \cos^2(A) - \sin^2(A)$$

$$\cos(2A) = 2\cos^2(A) - 1$$

$$\cos(2A) = 1 - 2\sin^2(A)$$

$$\sin^2(x) = (1 - \cos(2x))/2$$

$$\cos^2(x) = (1 + \cos(2x))/2$$

$$\sin(A \pm B) = \sin(A)\cos(B) \pm \cos(A)\sin(B)$$

$$\sin(2x) = 2\sin(x)\cos(x).$$

2. Hyperbolic.

$$\sinh(x) = \frac{1}{2}(e^x - e^{-x})$$

$$\cosh(x) = \frac{1}{2}(e^x + e^{-x})$$

3. Integration by Parts.

$$\int u dv = uv - \int v du$$

4. Inverse Trig.

$$\frac{d}{dx} \sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \tan^{-1}(x) = \frac{1}{1+x^2}$$

$$\int \frac{dx}{x^2+a^2} = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right)$$

5. Trig Substitutions.

$$\text{For } \sqrt{a^2 - x^2} \text{ use } x = a \sin(\theta)$$

$$\text{For } \sqrt{a^2 + x^2} \text{ use } x = a \tan(\theta)$$

$$\text{For } \sqrt{x^2 - a^2} \text{ use } x = a \sec(\theta)$$

6. Some integrals.

$$\int \tan(x) dx = \ln |\sec(x)| + C$$

$$\int \sec(x) dx = \ln |\sec(x) + \tan(x)| + C$$