Trig Formulas

Pythagorean Formulas: (Memorize only these)

1. $\sin^2(x) + \cos^2(x) = 1$
2. $\tan^2(x) + 1 = \sec^2(x)$
3. $1 + \cot^2(x) = \csc^2(x)$

Sum & Difference Formulas:

1. $\sin(x_1 \pm x_2) = \sin(x_1)\cos(x_2) \pm \cos(x_1)\sin(x_2)$
2. $\cos(x_1 \pm x_2) = \cos(x_1)\cos(x_2) \mp \sin(x_1)\sin(x_2)$
3. $\tan(x_1 \pm x_2) = \dfrac{\tan(x_1) \pm \tan(x_2)}{1 - \tan(x_1)\tan(x_2)}$

Double Angle Formulas:

1. $\sin(2x) = 2\sin(x)\cos(x)$
2. $\begin{aligned}\cos(2x) &= \cos^2(x) - \sin^2(x) \\ &= 2\cos^2(x) - 1 \\ &= 1 - 2\sin^2(x)\end{aligned}$

Half Angle Formulas:

1. $\sin\left(\frac{x}{2}\right) = \pm\sqrt{\frac{1-\cos(x)}{2}}$ OR $\sin(x) = \pm\sqrt{\frac{1-\cos(2x)}{2}}$

2. $\cos\left(\frac{x}{2}\right) = \pm\sqrt{\frac{1+\cos(x)}{2}}$ OR $\cos(x) = \pm\sqrt{\frac{1+\cos(2x)}{2}}$

Product Formulas:

1. $\sin(x_1)\sin(x_2) = \frac{1}{2}\Big(\cos(x_1 - x_2) - \cos(x_1 + x_2)\Big)$
2. $\cos(x_1)\cos(x_2) = \frac{1}{2}\Big(\cos(x_1 - x_2) + \cos(x_1 + x_2)\Big)$
3. $\sin(x_1)\cos(x_2) = \frac{1}{2}\Big(\sin(x_1 - x_2) + \sin(x_1 + x_2)\Big)$