

Double-Angle Formulas: $\sin(2u) = 2 \sin(u) \cos(u)$, $\cos(2u) = \cos^2(u) - \sin^2(u) = 2 \cos^2(u) - 1 = 1 - 2 \sin^2(u)$,

$$\tan(2u) = \frac{2 \tan(u)}{1 - \tan^2(u)} = \frac{\sin(2u)}{\cos(2u)}$$

Half-Angle Formulas: $\sin\left(\frac{u}{2}\right) = \pm \sqrt{\frac{1 - \cos(u)}{2}}$, $\cos\left(\frac{u}{2}\right) = \pm \sqrt{\frac{1 + \cos(u)}{2}}$, $\tan\left(\frac{u}{2}\right) = \frac{1 - \cos(u)}{\sin(u)} = \frac{\sin\left(\frac{u}{2}\right)}{\cos\left(\frac{u}{2}\right)}$!!!

You have to determine the " \pm " by determining the quadrant in which $\frac{u}{2}$ resides.

Power-Reducing Formulas: $\sin^2(u) = \frac{1 - \cos(2u)}{2}$, $\cos^2(u) = \frac{1 + \cos(2u)}{2}$, $\tan^2(u) = \frac{1 - \cos(2u)}{1 + \cos(2u)} = \frac{\sin^2(u)}{\cos^2(u)}$

Product-to-Sum Formulas

$$\sin u \sin v = \frac{1}{2} [\cos(u - v) - \cos(u + v)]$$

$$\cos u \cos v = \frac{1}{2} [\cos(u - v) + \cos(u + v)]$$

$$\sin u \cos v = \frac{1}{2} [\sin(u + v) + \sin(u - v)]$$

Sum-to-Product Formulas

$$\sin u + \sin v = 2 \sin\left(\frac{u + v}{2}\right) \cos\left(\frac{u - v}{2}\right)$$

$$\cos u + \cos v = 2 \cos\left(\frac{u + v}{2}\right) \cos\left(\frac{u - v}{2}\right)$$

$$\cos u - \cos v = -2 \sin\left(\frac{u + v}{2}\right) \sin\left(\frac{u - v}{2}\right)$$

Pythagorean Identities

$$\tan^2(x) + 1 = \sec^2(x)$$

$$\cot^2(x) + 1 = \csc^2(x)$$

Angle Sum Formulas

$$\sin(u + v) = \sin(u) \cos(v) + \sin(v) \cos(u)$$

$$\cos(u + v) = \cos(u) \cos(v) - \sin(u) \sin(v)$$

Radians without π

1.570796327

3.141592654

6.283185308

4.712388981

Law of Sines $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ **Law of Cosines** $a^2 = b^2 + c^2 - 2bc \cos A$

Heron's $Area = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$. **Magnitude** $\vec{u} = \langle a, b \rangle \Rightarrow \|\vec{u}\| = \sqrt{a^2 + b^2}$

Arc Length: $s = r\theta$, **Area of a Sector:** $A = \frac{1}{2} r^2 \theta$

This is a cheat sheet for later in the semester. I put the stuff we'll be using on Test 2 in boxes.