Math 42 Spring 2015 — Formula Sheet

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Geometry	
Arc length $s = \theta r$	Linear speed $= \dfrac{\text{arc length}}{\text{time}}$
Sector area $A = \frac{1}{2}\theta r^2$	Angular speed $= \dfrac{\text{central angle measure}}{\text{time}}$
Area $= \frac{1}{2}bc\sin A$	Area $= \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \dfrac{a+b+c}{2}$

Laws of Sines and Cosines	
$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$	$\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Pythagorean Identities	
$1 + \tan^2\theta = \sec^2\theta$	$1 + \cot^2\theta = \csc^2\theta$

Even and Odd Functions		
$\cos\theta = \cos(-\theta)$	$\sin(-\theta) = -\sin\theta$	$\tan(-\theta) = -\tan\theta$

Simple Harmonic Motion	
period $= \dfrac{2\pi}{\omega}$	frequency $= \dfrac{\omega}{2\pi}$

Sum and Difference Formulas	
$\sin(u+v) = \sin u\cos v + \cos u\sin v$	$\sin(u-v) = \sin u\cos v - \cos u\sin v$
$\cos(u+v) = \cos u\cos v - \sin u\sin v$	$\cos(u-v) = \cos u\cos v + \sin u\sin v$
$\tan(u+v) = \dfrac{\tan u + \tan v}{1 - \tan u\tan v}$	$\tan(u-v) = \dfrac{\tan u - \tan v}{1 + \tan u\tan v}$

Double and Half Angle Formulas		
$\sin\left(\dfrac{u}{2}\right) = \pm\sqrt{\dfrac{1-\cos u}{2}}$	$\cos\left(\dfrac{u}{2}\right) = \pm\sqrt{\dfrac{1+\cos u}{2}}$	$\tan\left(\dfrac{u}{2}\right) = \dfrac{1-\cos u}{\sin u} = \dfrac{\sin u}{1+\cos u}$
$\sin(2u) = 2\sin u\cos u$	$\cos(2u) = \cos^2 u - \sin^2 u$	$^*\tan(2u) = \dfrac{2\tan u}{1-\tan^2 u}$
		*If both sides exist

More Formulas	
$\sin u \sin v = \frac{1}{2}[\cos(u-v) - \cos(u+v)]$	$\sin u + \sin v = 2\sin\left(\frac{u+v}{2}\right)\cos\left(\frac{u-v}{2}\right)$
$\cos u \cos v = \frac{1}{2}[\cos(u-v) + \cos(u+v)]$	$\sin u - \sin v = 2\cos\left(\frac{u+v}{2}\right)\sin\left(\frac{u-v}{2}\right)$
$\sin u \cos v = \frac{1}{2}[\sin(u+v) + \sin(u-v)]$	$\cos u + \cos v = 2\cos\left(\frac{u+v}{2}\right)\cos\left(\frac{u-v}{2}\right)$
$= \frac{1}{2}[\sin(u+v) - \cos(v-u)]$	$\cos u - \cos v = -2\sin\left(\frac{u+v}{2}\right)\sin\left(\frac{u-v}{2}\right)$
$\sin^2 u = \frac{1-\cos(2u)}{2}$	$\tan^2 u = \frac{1-\cos(2u)}{1+\cos(2u)}$
$\cos^2 u = \frac{1+\cos(2u)}{2}$	