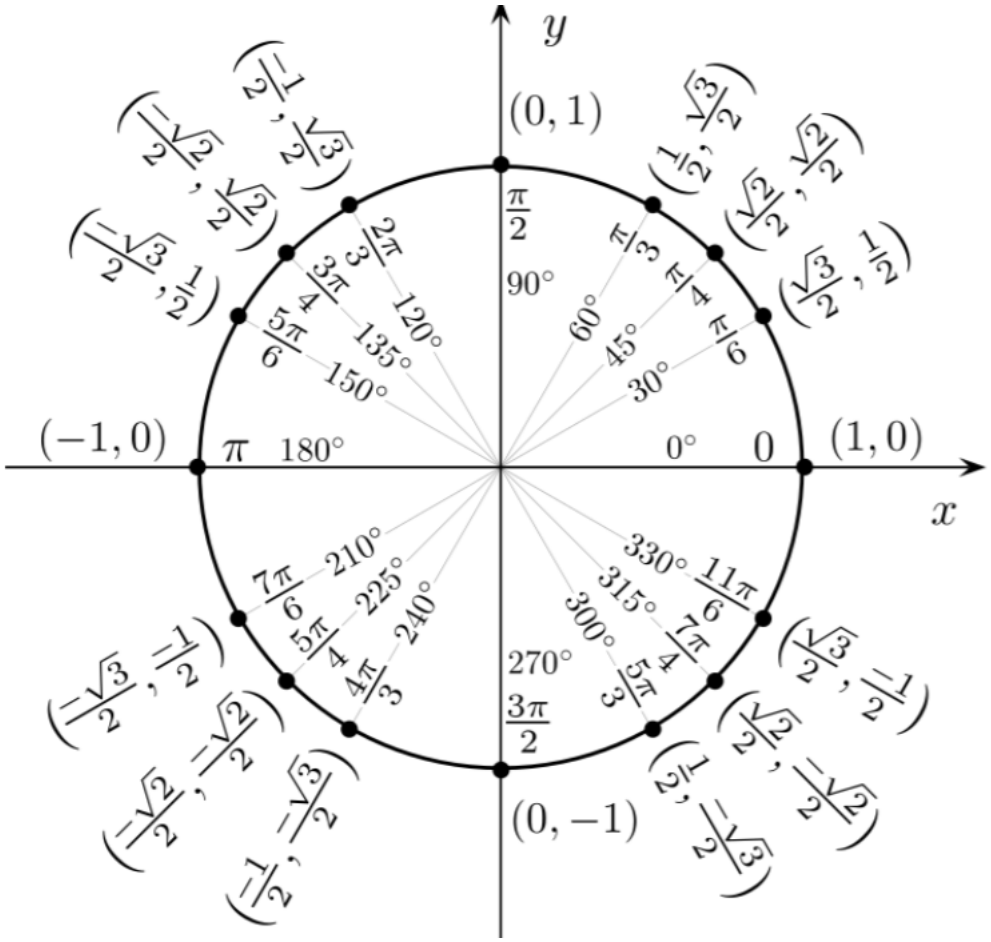
You can rip this page off if needed and use for the rest of the exam.

Pythagorean Trig Identities



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

Sum and Difference Formulas

1. $\sin(u+v) = \sin(u)\cos(v) + \cos(u)\sin(v)$
2. $\sin(u-v) = \sin(u)\cos(v) - \cos(u)\sin(v)$
3. $\cos(u+v) = \cos(u)\cos(v) - \sin(u)\sin(v)$
4. $\cos(u-v) = \cos(u)\cos(v) + \sin(u)\sin(v)$
5. $\tan(u+v) = \dfrac{\tan(u)+\tan(v)}{1-\tan(u)\tan(v)}$
6. $\tan(u-v) = \dfrac{\tan(u)-\tan(v)}{1+\tan(u)\tan(v)}$

Law of Sines

1. $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Law of Cosines

1. $a^2 = b^2 + c^2 - 2bc\cos(A)$
2. $b^2 = a^2 + c^2 - 2ac\cos(B)$
3. $c^2 = a^2 + b^2 - 2ab\cos(C)$

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1. Prove the following double angle formulas using the angle sum formulas. Hint: 2x = x+x

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

b) $\cos(2x) = \cos^2(x) - \sin^2(x)$

2. Find the Exact Values (By hand)(Not showing work is worth 0 pts)

a) $\sin\left(\frac{5\pi}{12}\right)$

b) $\cos\left(\frac{5\pi}{12}\right)$

c) $\tan\left(\frac{5\pi}{12}\right)$

3. Find All Solutions to the Following:

a) $2\cos(3x) + 1 = 0$

b) $\Big(\tan^2(x) - 1\Big)\sin(x) = 0$

c) $\sec x \cos x - \sec x = 0$

4. Solve for any possible triangles, round to two decimal places if needed. If not possible, indicate so:

a) $a = 2, b = 5, c = 11$

b) $A = 50°, a = 15, B = 60°$

c) $A = 100°, a = 25, b = 10$

5. Word Problems

a) A pilot measures the angle of depression to two ships in the water in front of the plane as 30 degrees and 50 degrees respectively. If the pilot is flying at an altitude of 45,000 feet. Draw a picture to represent the problem and determine the distance between the two ships. Round to the nearest foot.

b)Points P and Q are separated by a lake. To find the distance between them, a surveyor locates point R on land such that the angle made by PRQ (angle R) is 130 degrees, the distance from P to R is 250 feet, and the distance from Q to R is 475 feet. Draw a picture to represent the problem and find the distance between points P and Q. Round to the nearest foot

Extra Credit: Earlier you proved $\cos(2x) = \cos^2(x) - \sin^2(x)$ rewrite $\cos(2x)$ in terms of $\sin x$. Or rewrite into into terms of $\cos x$. Or do both options (for more extra credit!):