HPC 3/6/17

- Students will use the sum and difference formulas to find the values for trig functions that are not the standard angles found on the unit circle.
- Students will see their test scores.
- Students who have not taken the summative assessment on identities will give me the time that they will take the test either today or Tuesday.

Mar 6-7:16 AM

Sum and Difference Formulas Students will use the sum and difference formulas for sines, cosines, and tangents.	Precalculus

Sum and Difference Identities

$$\sin(u+v) = \sin u \cos v + \cos u \sin v$$
$$\sin(u-v) = \sin u \cos v - \cos u \sin v$$
$$\cos(u+v) = \cos u \cos v - \sin u \sin v$$
$$\cos(u-v) = \cos u \cos v + \sin u \sin v$$
$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$
$$\tan(u-v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

When using the sum and difference formulas replace the variables **u** and **v** with angle measures found on the unit circle that will allow you to find the value of trig function of an angle not found on the unit circle.

Example 1: ***Using the Sine/Cosine of a sum or difference to find the exact value.***

$u = 60^\circ$
$v = 45$

a. $\cos 15^\circ = \cos(60^\circ - 45^\circ) = \cos 60^\circ \cos 45 + \sin 60^\circ \sin 45^\circ$

$\left(\frac{1}{2}\cdot\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$

$\frac{\sqrt{2}+\sqrt{6}}{4}$

$u = 30^\circ$
$v = 45^\circ$

b. $\sin 75^\circ = \sin(30^\circ + 45^\circ) = \sin 30^\circ \cos 45^\circ + \cos 30^\circ \sin 45^\circ$

$= \left(\frac{1}{2}\cdot\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}\right)$

$\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4} = \frac{\sqrt{2}+\sqrt{6}}{4}$

Sum and Difference Formulas

Students will use the sum and difference formulas for sines, cosines, and tangents.

Precalculus

Example 2: ***Using the Sine/Cosine of a sum or difference to find the exact value.***

$\frac{7\pi}{12} \cdot \frac{180^\circ}{\pi} = 105^\circ$

a. $\sin \frac{7\pi}{12} = \sin\left(\frac{\pi}{4} + \frac{\pi}{3}\right) = \sin\frac{\pi}{4}\cos\frac{\pi}{3} + \cos\frac{\pi}{4}\sin\frac{\pi}{3}$

$= \left(\frac{\sqrt{2}}{2} \cdot \frac{1}{2}\right) + \left(\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2}\right) = \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$

$= \frac{\sqrt{2}+\sqrt{6}}{4}$

15°

$u = \frac{\pi}{4}$

$v = \frac{\pi}{6}$

b. $\tan \frac{\pi}{12} = \tan\left(\frac{\pi}{4} - \frac{\pi}{6}\right) = \frac{\tan\frac{\pi}{4} - \tan\frac{\pi}{6}}{1 + \tan\frac{\pi}{4}\tan\frac{\pi}{6}} =$

$\frac{1-\sqrt{3}}{1+(1)(\sqrt{3})} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$

Example 3: ***Write each expression as the sine, cosine or tangent of an angle. Then find the exact value of the expression.***

$u = 80$

$v = 20$

a. $\cos 80^\circ \cos 20^\circ + \sin 80^\circ \sin 20^\circ = \cos(80^\circ - 20^\circ) = \cos 60^\circ = \frac{1}{2}$

$u = 25^\circ$

$v = 20^\circ$

b. $\cos 25^\circ \cos 20^\circ - \sin 25 \sin 20 = \cos(25^\circ + 20^\circ) = \cos 45^\circ = \frac{\sqrt{2}}{2}$

Sum and Difference Formulas

Name:________________ Date:_______

Find the exact value of each expression.

1. cos 105°
2. sin 15°
3. cos 75°
4. sin 255°
5. Cos 285°
6. Cos 195°
7. Tan 105

8. $\tan 195°$

9. $\operatorname{Tan} 165°$

Write each expression as the sine, cosine or tangent of an angle. Then find the exact value of the expression.

10. $\sin 25° \cos 5° + \cos 25° \sin 5°$

11. $\cos 105° \cos 45° + \sin 105° \sin 45°$

12. $\frac{\tan 10° + \tan 35°}{1 - \tan 10° \tan 35°}$

13. $\sin \frac{5\pi}{12} \cos \frac{\pi}{4} - \cos \frac{5\pi}{12} \sin \frac{\pi}{4}$

14. $\frac{\tan \frac{\pi}{5} - \tan \frac{\pi}{30}}{1 + \tan \frac{\pi}{5} \tan \frac{\pi}{30}}$