

Wednesday, February 27, 2019
6:29 PM

KEY

Precalc

5.4B: Sum and Dif. Formulas

Obj: To apply the sum and difference formulas to evaluate trig functions

Hwk: 5.4B #5, 11, 23, 27. FOLLOW DIRECTIONS!!!

Finish 5.4A Worksheet

Study Trig Facts (5.4 Intro worksheet)

5.4 Quiz Monday

Do Now:

Write each as the sin, cos, or tan of a single angle & evaluate.

1. $\sin 140^\circ \cos 85^\circ + \cos 140^\circ \sin 85^\circ$

$= \sin(140^\circ + 85^\circ)$
 $= \sin(225^\circ) = \boxed{-\frac{\sqrt{2}}{2}}$

2. $\cos \frac{\pi}{2} \cos \frac{\pi}{3} - \sin \frac{\pi}{2} \sin \frac{\pi}{3}$

$= \cos(\frac{\pi}{2} + \frac{\pi}{3})$
 $= \cos(\frac{3\pi}{6} + \frac{2\pi}{6})$
 $= \cos \frac{5\pi}{6} = \boxed{-\frac{\sqrt{3}}{2}}$

3. $\frac{\tan 80^\circ - \tan 20^\circ}{1 + \tan 80^\circ \tan 20^\circ}$

$= \tan(80^\circ - 20^\circ)$
 $= \tan 60^\circ = \boxed{\sqrt{3}}$

How to remember the formulas since YOU MUST MEMORIZE THEM?

Sum and difference formulas:

$\sin(u \pm v) = \sin u \cdot \cos v \pm \cos u \cdot \sin v$

MIX
(trig functions) &
MATCH (signs)

$\cos(u \pm v) = \cos u \cdot \cos v \mp \sin u \cdot \sin v$

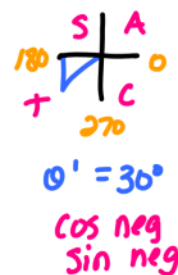
$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \cdot \tan v}$

MATCH
(trig functions) &
MIX (signs)

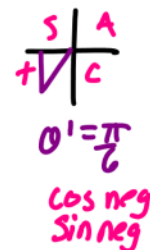
These are used to find nonstandard angles. It's up to you to break up the angle you seek into a "+" or "-" problem.

Examples: Evaluate using the sum/difference formulas:

$$\begin{aligned}
 1. \sin 255^\circ &= \sin(45^\circ + 210^\circ) \\
 &= \sin 45^\circ \cos 210^\circ + \cos 45^\circ \sin 210^\circ \\
 &= \left(\frac{\sqrt{2}}{2}\right) \left(-\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right) \left(-\frac{1}{2}\right) \\
 &= -\frac{\sqrt{6}}{4} + -\frac{\sqrt{2}}{4} = \boxed{-\frac{\sqrt{6} - \sqrt{2}}{4}}
 \end{aligned}$$



$$\begin{aligned}
 2. \cos\left(-\frac{5\pi}{6}\right) &= \cos\left(\frac{2\pi}{6} - \frac{7\pi}{6}\right) \\
 &= \cos\left(\frac{\pi}{3} - \frac{7\pi}{6}\right) \\
 &= \cos \frac{\pi}{3} \cos \frac{7\pi}{6} + \sin \frac{\pi}{3} \sin \frac{7\pi}{6} \\
 &= \left(\frac{1}{2}\right) \left(-\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{3}}{2}\right) \left(-\frac{1}{2}\right) \\
 &= -\frac{\sqrt{3}}{4} + -\frac{\sqrt{3}}{4} = -\frac{2\sqrt{3}}{4} = \boxed{-\frac{\sqrt{3}}{2}}
 \end{aligned}$$



3. $\tan 165^\circ$

$$\begin{aligned}
 &= \tan(120^\circ + 45^\circ) \\
 &= \frac{\tan 120^\circ + \tan 45^\circ}{1 - \tan 120^\circ \tan 45^\circ} = \\
 &= \frac{-\sqrt{3} + 1}{1 - (-\sqrt{3})(1)} = \frac{(1-\sqrt{3}) \cdot (1-\sqrt{3})}{(1+\sqrt{3})(1-\sqrt{3})}
 \end{aligned}$$



$$= \frac{1 - 2\sqrt{3} + 3}{1 - 3} = \frac{4 - 2\sqrt{3}}{-2} = \frac{4}{-2} + \frac{-2\sqrt{3}}{-2} = \boxed{-2 + \sqrt{3}}$$

Write the expression as the sine, cosine, or tangent of an angle.

$$4. \sin 140^\circ \cos 50^\circ - \cos 140^\circ \sin 50^\circ$$

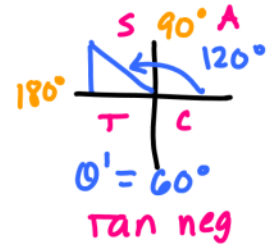
$$= \sin(140^\circ - 50^\circ) = \sin 90^\circ = \boxed{1}$$



$$5. \frac{\tan 140^\circ - \tan 20^\circ}{1 + \tan 140^\circ \tan 20^\circ} = \tan(140^\circ - 20^\circ)$$

$$= \tan(120^\circ)$$

$$= \boxed{-\sqrt{3}}$$



$$6. \cos \frac{7\pi}{15} \cos \frac{3\pi}{10} + \sin \frac{7\pi}{15} \sin \frac{3\pi}{10}$$

$$= \cos \left(\frac{2\pi}{2} \frac{7}{15} - \frac{3\pi}{10} \frac{3}{3} \right) = \cos \left(\frac{14\pi}{30} - \frac{9\pi}{30} \right) = \cos \frac{5\pi}{30} = \cos \frac{\pi}{6}$$

$$= \boxed{\frac{\sqrt{3}}{2}}$$

Get into groups! Finish worksheet from yesterday