PreCalculus
Sum and Difference Identities WS 3 – Tangent

Name ___Fyston___

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

Find the exact value of each expression.

1. $\tan\left(\dfrac{\pi}{4} + \dfrac{\pi}{3}\right) = \dfrac{\tan\frac{\pi}{4} + \tan\frac{\pi}{3}}{1 - \tan\frac{\pi}{4} \cdot \tan\frac{\pi}{3}}$

$= \dfrac{(1+\sqrt{3})}{(1-\sqrt{3})} \cdot \dfrac{(1+\sqrt{3})}{(1+\sqrt{3})} = \dfrac{1+2\sqrt{3}+3}{1-3}$

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

2. $\tan\dfrac{\pi}{4} + \tan\dfrac{\pi}{3} = \boxed{1 + \sqrt{3}}$
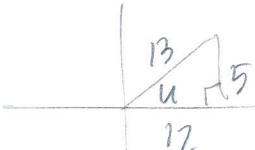
Find the exact value of the trigonometric function given the following:

$$\sin u = \frac{5}{13}, \quad 0 < u < \frac{\pi}{2} \quad \text{and} \quad \cos v = -\frac{3}{5}, \quad \frac{\pi}{2} < v < \pi$$

3. $\tan(u+v)$

$\dfrac{\tan u + \tan v}{1 - \tan u \tan v} = \dfrac{\frac{5}{12} + \left(-\frac{4}{3}\right) \cdot \frac{4}{4}}{1 - \left(\frac{5}{12}\right)\left(\frac{4}{3}\right)}$

$= \dfrac{-\frac{11}{12}}{\frac{56}{36}} = -\frac{11}{12} \cdot \frac{36}{56} = \boxed{-\frac{33}{56}}$

4. $\tan(u-v)$

$\dfrac{\tan u - \tan v}{1 + \tan u \cdot \tan v}$

$= \dfrac{\frac{5}{12} - \left(-\frac{4}{3}\right)}{1 + \left(\frac{5}{12}\right)\left(-\frac{4}{3}\right)} = \dfrac{\frac{21}{12}}{\frac{16}{36}} = \frac{21}{12} \cdot \frac{36}{16} = \boxed{\frac{63}{16}}$

Use the sum and difference formulas to write the expression as the sine, cosine, or tangent of a single angle.

5. $\cos 40° \cos 15° - \sin 40° \sin 15° = \cos(40° + 15°) = \boxed{\cos 55°}$

6. $\sin 340° \cos 50° - \cos 340° \sin 50° = \sin(340° - 50°) = \boxed{\sin 290°}$

7. $\dfrac{\tan 325° - \tan 86°}{1 + \tan 325° \tan 86°} = \tan(325° - 86°) = \boxed{\tan 239°}$