PreCalculus

Name Key

Sum and Difference Identities WS 3 – Tangent

Find the exact value of each expression.

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

$\frac{\tan\frac{\pi}{4}+\tan\frac{\pi}{3}}{1-\tan\frac{\pi}{4}\tan\frac{\pi}{3}} = \frac{1+\sqrt{3}}{1-1\cdot\sqrt{3}} =$

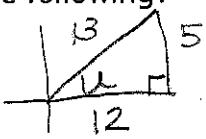
$\frac{1+\sqrt{3}}{1-\sqrt{3}}\cdot\frac{(1+\sqrt{3})}{(1+\sqrt{3})} = \frac{1+2\sqrt{3}+3}{1-3} = \frac{4+2\sqrt{3}}{-2} \div -2$ $\boxed{-2-\sqrt{3}}$

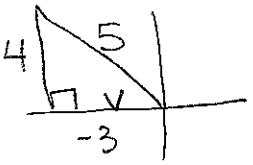
2. $\tan\frac{\pi}{4}+\tan\frac{\pi}{3}$

$\boxed{1+\sqrt{3}}$

Find the exact value of the trigonometric function given the following:

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





3. $\tan(u+v)$

$\frac{\tan u+\tan v}{1-\tan u\tan v} = \frac{\frac{5}{12}+\frac{4}{-3}}{1-\frac{5}{12}\cdot\frac{-4}{3}} =$

$\frac{\frac{5}{12}-\frac{16}{12}}{1+\frac{20}{36}} = \frac{-\frac{11}{12}}{\frac{36}{36}+\frac{20}{36}} = \frac{-\frac{11}{12}}{\frac{56}{36}} =$

$-\frac{11}{12}\cdot\frac{36^3}{56} = \boxed{-\frac{33}{56}}$

4. $\tan(u-v)$

$\frac{\tan u-\tan v}{1+\tan u\tan v} = \frac{\frac{5}{12}+\frac{+4}{3}}{1+\frac{5}{12}\cdot\frac{-4}{3}} =$

$\frac{\frac{5}{12}+\frac{16}{12}}{1-\frac{20}{36}} = \frac{\frac{21}{12}}{\frac{36}{36}-\frac{20}{36}} = \frac{\frac{21}{12}}{\frac{16}{36}} =$

$\frac{21}{12}\cdot\frac{36^3}{16} = \boxed{\frac{63}{16}}$

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

5. $\cos 40^\circ\cos 15^\circ - \sin 40^\circ\sin 15^\circ = \cos(40^\circ+15^\circ) = \cos(55^\circ)$

6. $\sin 340^\circ\cos 50^\circ - \cos 340^\circ\sin 50^\circ = \sin(340^\circ-50^\circ) = \sin(290^\circ)$

7. $\frac{\tan 325^\circ - \tan 86^\circ}{1+\tan 325^\circ\tan 86^\circ} = \tan(325^\circ-86^\circ) = \tan(239^\circ)$