$\frac{17\pi}{12} = \frac{9\pi}{12} + \frac{8\pi}{12} = \frac{3\pi}{4} + \frac{2\pi}{3}$

SUM AND DIFFERENCE IDENTITIES FOR TANGENT

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

1. Use the sum or difference identities to find the exact value.

$$\tan\frac{17\pi}{12} = \tan\left(\frac{3\pi}{4} + \frac{2\pi}{3}\right)$$

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

FOIL
FL

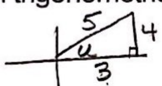
$$= \frac{(-1-\sqrt{3})}{(1-\sqrt{3})} \cdot \frac{(1+\sqrt{3})}{(1+\sqrt{3})} = \frac{-1-\sqrt{3}-\sqrt{3}-3}{1-3}$$

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

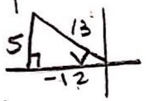
$$\frac{\cancel{-2}(2+\sqrt{3})}{\cancel{-2}}$$

2. Find the exact value of each trigonometric function, given:

$\sin u = \frac{4}{5}$ (o/h), where $0 < u < \frac{\pi}{2}$ and



$\cos v = -\frac{12}{13}$ (a/h), where $\frac{\pi}{2} < v < \pi$.



a. $\tan(u+v)$

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

$$= \frac{\frac{4}{3} + \frac{5}{-12}}{1 - \left(\frac{4}{3}\right)\left(-\frac{5}{12}\right)}$$

$$= \frac{\frac{11}{12}}{1+\frac{5}{9}} = \frac{\frac{11}{12}}{\frac{14}{9}} = \frac{11}{12}\cdot\frac{9}{14} = \frac{99}{168} = \boxed{\frac{33}{56}}$$

b. $\tan(u-v)$

$$\frac{\tan u - \tan v}{1 + \tan u \tan v} = \frac{\frac{4}{3} - \left(-\frac{5}{12}\right)}{1+\left(\frac{4}{3}\right)\left(-\frac{5}{12}\right)} = \frac{\frac{7}{4}}{1-\frac{5}{9}} = \frac{\frac{7}{4}}{\frac{4}{9}}$$

$$= \frac{7}{4}\cdot\frac{9}{4} = \boxed{\frac{63}{16}}$$