

10. a) $\sin 15^\circ$

$\sin(45-30)$

$\sin 45 \cos 30 - \cos 45 \sin 30$

$$\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \boxed{\frac{\sqrt{6}-\sqrt{2}}{4}}$$

b) $\cos 15^\circ$

$\cos(45-30)$

$\cos 45 \cos 30 + \sin 45 \sin 30$

$$\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \boxed{\frac{\sqrt{6}+\sqrt{2}}{4}}$$

c) $\tan 15^\circ$

$\tan(45-30)$

$$\frac{\tan 45 - \tan 30}{1 + \tan 45 \tan 30} = \frac{1 - \frac{\sqrt{3}}{3}}{1 + 1 \cdot \frac{\sqrt{3}}{3}} = \frac{\frac{3}{3} - \frac{\sqrt{3}}{3}}{\frac{3}{3} + \frac{\sqrt{3}}{3}} = \frac{3-\sqrt{3}}{3+\sqrt{3}}$$

$$\frac{3-\sqrt{3}}{3+\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3-\sqrt{3}} = \frac{3-\sqrt{3}}{3+\sqrt{3}} \cdot \frac{(3-\sqrt{3})}{(3-\sqrt{3})} = \frac{9-6\sqrt{3}+3}{9-3} = \frac{12-6\sqrt{3}}{6} = \boxed{2-\sqrt{3}}$$

16. a) $\sin \frac{17\pi}{12}$

$\sin(\frac{15\pi}{12} + \frac{2\pi}{12})$

$\sin(\frac{5\pi}{4} + \frac{\pi}{6})$

$\sin \frac{5\pi}{4} \cos \frac{\pi}{6} + \cos \frac{5\pi}{4} \sin \frac{\pi}{6}$

$$-\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + -\frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{-\sqrt{6}-\sqrt{2}}{4}$$

c) $\tan \frac{17\pi}{12}$

$\tan(\frac{5\pi}{4} + \frac{\pi}{6})$

$\tan \frac{5\pi}{4} + \tan \frac{\pi}{6}$

$\frac{1 - \tan \frac{5\pi}{4} \tan \frac{\pi}{6}}{1 + \frac{\sqrt{3}}{3}}$

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

$$\frac{3-\sqrt{3}}{3+\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3-\sqrt{3}} = \frac{3-\sqrt{3}}{3-\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3+\sqrt{3}} = \frac{3-\sqrt{3}}{3+\sqrt{3}}$$

$$\frac{3-\sqrt{3}}{3+\sqrt{3}} \cdot \frac{(3+\sqrt{3})}{(3+\sqrt{3})} = \frac{9+6\sqrt{3}+3}{9-3} = \frac{12+6\sqrt{3}}{6} = \boxed{2+\sqrt{3}}$$

b) $\cos \frac{17\pi}{12}$

$\cos(\frac{5\pi}{4} + \frac{\pi}{6})$

$\cos \frac{5\pi}{4} \cos \frac{\pi}{6} - \sin \frac{5\pi}{4} \sin \frac{\pi}{6}$

$$-\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - -\frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{-\sqrt{6}+\sqrt{2}}{4}$$

$$19. \cos(40+15) = \cos(55^\circ)$$

$$20. \sin(110+80) = \sin(190^\circ)$$

$$21. \sin(340-50) = \sin(290^\circ)$$

$$22. \cos(20-30) = \overset{r}{\cos(-10)} = \cos(10^\circ)$$

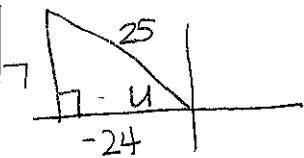
$$23. \tan(325-86) = \tan(239^\circ)$$

$$24. \tan(140-60) = \tan(80^\circ)$$

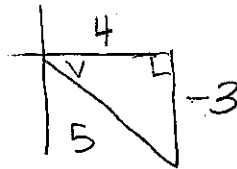
$$27. \cos\left(\frac{\pi}{7} + \frac{\pi}{5}\right) = \cos\left(\frac{5\pi}{35} + \frac{7\pi}{35}\right) = \cos\left(\frac{12\pi}{35}\right)$$

$$28. \sin\left(\frac{2\pi}{9} + \frac{\pi}{10}\right) = \sin\left(\frac{20\pi}{90} + \frac{9\pi}{90}\right) = \sin\left(\frac{29\pi}{90}\right)$$

S-
C+
T-



$$\begin{aligned} 7^2 + b^2 &= 25^2 \\ 49 + b^2 &= 625 \\ b^2 &= 576 \\ b &= 24 \end{aligned}$$



$$\begin{aligned} 39. \cos(u+v) &= \cos u \cos v - \sin u \sin v \\ &= \frac{-24}{25} \cdot \frac{4}{5} - \frac{7}{25} \cdot \frac{-3}{5} = \frac{-96}{125} + \frac{21}{125} = \frac{-75}{125} = \boxed{\frac{-3}{5}} \end{aligned}$$

$$\begin{aligned} 40. \sin(u+v) &= \sin u \cos v + \cos u \sin v \\ &= \frac{7}{25} \cdot \frac{4}{5} + \frac{-24}{25} \cdot \frac{-3}{5} = \frac{28}{125} + \frac{72}{125} = \frac{100}{125} = \boxed{\frac{4}{5}} \end{aligned}$$

$$\begin{aligned} 41. \sin(v-u) &= \sin v \cos u - \cos v \sin u \\ &= \frac{3}{5} \cdot \frac{-24}{25} - \frac{4}{5} \cdot \frac{7}{25} = \frac{-72}{125} - \frac{28}{125} = \boxed{\frac{-100}{125}} \end{aligned}$$

$$\begin{aligned} 42. \cos(u-v) &= \cos u \cos v + \sin u \sin v \\ &= \frac{-24}{25} \cdot \frac{4}{5} + \frac{7}{25} \cdot \frac{-3}{5} = \frac{-96}{125} - \frac{21}{125} = \boxed{\frac{-117}{125}} \end{aligned}$$

$$\begin{aligned} 43. \tan(u+v) &= \frac{\tan u + \tan v}{1 - \tan u \tan v} = \frac{\frac{7}{24} + \frac{-3}{4}}{1 - \frac{7}{24} \cdot \frac{3}{4}} = \frac{\frac{7}{24} + \frac{-18}{24}}{\frac{96}{96} - \frac{21}{96}} \\ &= \frac{-25/24}{75/96} = \frac{-25}{24} \cdot \frac{96}{75} = \boxed{\frac{-4}{3}} \end{aligned}$$

$$\begin{aligned} 44. \tan(u-v) &= \frac{\tan u - \tan v}{1 + \tan u \tan v} = \frac{\frac{7}{24} - \frac{-3}{4}}{1 + \frac{7}{24} \cdot \frac{-3}{4}} = \frac{\frac{7}{24} + \frac{18}{24}}{\frac{96}{96} + \frac{21}{96}} \\ &= \frac{11/24}{117/96} = \frac{11}{24} \cdot \frac{96}{117} = \boxed{\frac{44}{117}} \end{aligned}$$