

۱) الف) $\tan \frac{11\pi}{6} + \sin \frac{10\pi}{6} \cos \frac{13\pi}{6} = -1 + \left(\frac{-\sqrt{3}}{2}\right)\left(\frac{-\sqrt{3}}{2}\right) = -1 + \frac{1}{2}$
 $\frac{11\pi}{6} \rightarrow \frac{7\pi}{6} \rightarrow \frac{5\pi}{6} \rightarrow \frac{3\pi}{6} \rightarrow \frac{1\pi}{6}$
 $\frac{10\pi}{6} \rightarrow \frac{5\pi}{3} \rightarrow \frac{4\pi}{3} \rightarrow \frac{3\pi}{3} \rightarrow \frac{2\pi}{3} \rightarrow \frac{\pi}{3}$
 $\frac{13\pi}{6} \rightarrow \frac{11\pi}{6} \rightarrow \frac{10\pi}{6} \rightarrow \frac{9\pi}{6} \rightarrow \frac{8\pi}{6} \rightarrow \frac{7\pi}{6}$
 $\frac{1\pi}{6} \rightarrow \frac{5\pi}{6} \rightarrow \frac{7\pi}{6} \rightarrow \frac{11\pi}{6}$
 $\frac{1}{2}$

ب) $\tan \frac{13\pi}{6} \sin \frac{11\pi}{6} + \cos \frac{10\pi}{6} = \frac{-\sqrt{3}}{2} \times \frac{-\sqrt{3}}{2} + \left(\frac{1}{2}\right) = 0$
 $\frac{13\pi}{6} \rightarrow \frac{11\pi}{6} \rightarrow \frac{10\pi}{6} \rightarrow \frac{9\pi}{6} \rightarrow \frac{8\pi}{6} \rightarrow \frac{7\pi}{6}$
 $\frac{11\pi}{6} \rightarrow \frac{5\pi}{3} \rightarrow \frac{4\pi}{3} \rightarrow \frac{3\pi}{3} \rightarrow \frac{2\pi}{3} \rightarrow \frac{\pi}{3}$
 $\frac{10\pi}{6} \rightarrow \frac{5\pi}{3} \rightarrow \frac{4\pi}{3} \rightarrow \frac{3\pi}{3} \rightarrow \frac{2\pi}{3} \rightarrow \frac{\pi}{3}$
 $\frac{1}{2}$

۲) $\cot \alpha = \frac{\cos \alpha}{\sin \alpha} = \frac{5k}{k}$
 $\cos \alpha = 5k$
 $\sin \alpha = k$
 $\frac{5k - k}{5k + k} = \frac{4k}{6k} = \frac{2}{3}$

۳) $\sin \alpha = \cos \alpha$
 $\sin^2 \alpha + \cos^2 \alpha = 1$
 $\cos^2 \alpha + \cos^2 \alpha = 1 \rightarrow 2\cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = \frac{1}{2} \rightarrow \cos \alpha = \pm \frac{1}{\sqrt{2}}$
 $\cos \alpha = \frac{1}{\sqrt{2}}$
 $\sin \alpha = \frac{1}{\sqrt{2}}$

۴) الف) $\cos\left(\frac{\pi}{6} + \alpha\right) = \cos \alpha \cos \frac{\pi}{6} - \sin \alpha \sin \frac{\pi}{6}$
 $\cos \alpha = \frac{1}{\sqrt{2}}$
 $\sin \alpha = \frac{1}{\sqrt{2}}$
 $\cos\left(\frac{\pi}{6} + \alpha\right) = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \cdot \frac{1}{2} = \frac{\sqrt{3}-1}{2\sqrt{2}}$
 $\frac{\sqrt{3}-1}{2\sqrt{2}}$

ب) $\sin\left(\frac{\pi}{6} + \alpha\right) = \sin \alpha \cos \frac{\pi}{6} + \cos \alpha \sin \frac{\pi}{6}$
 $\sin \alpha = \frac{1}{\sqrt{2}}$
 $\cos \alpha = \frac{1}{\sqrt{2}}$
 $\sin\left(\frac{\pi}{6} + \alpha\right) = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \cdot \frac{1}{2} = \frac{\sqrt{3}+1}{2\sqrt{2}}$
 $\frac{\sqrt{3}+1}{2\sqrt{2}}$

۵) $\cos^2 \alpha = 1 - \sin^2 \alpha$
 $r \sin^2 \alpha + 1 - \sin^2 \alpha = \sin^2 \alpha + 1 = \frac{1}{r} \rightarrow \sin^2 \alpha = \frac{1}{r}$
 $\cos^2 \alpha = 1 - \frac{1}{r} = \frac{r-1}{r}$
 $\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = \frac{\frac{1}{\sqrt{r}}}{\sqrt{\frac{r-1}{r}}} = \frac{1}{\sqrt{r-1}}$
 $\frac{1}{\sqrt{r-1}}$

soln: $\frac{1}{2} \times \sqrt{r} \times r \sin \alpha = \epsilon, \delta$

$\sqrt{r} \times \sin \alpha = \epsilon, \delta$

$\Rightarrow \sin \alpha = \frac{\epsilon, \delta}{\sqrt{r}} = \frac{\sqrt{r}}{r} \Rightarrow \sin \alpha = \frac{1}{\sqrt{r}} \Rightarrow \alpha = 45^\circ \text{ or } 135^\circ$

$\frac{1}{r} = \sqrt{r}$



$\frac{1}{r} \times r \times r \times \sin 135^\circ = \epsilon, \delta$

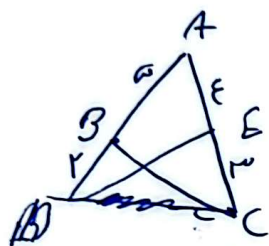
$\frac{1}{r} \times r \times r = \epsilon, \delta$

$r = 1 \Rightarrow r = \sqrt{1}$

$r = \pm \sqrt{1}$

$\epsilon, \delta = r \times r \times r + r \times r \times r = \sqrt{10} \sqrt{1}$

$\epsilon, \delta = \sigma, \delta \Rightarrow \epsilon, \delta = \sqrt{10}$

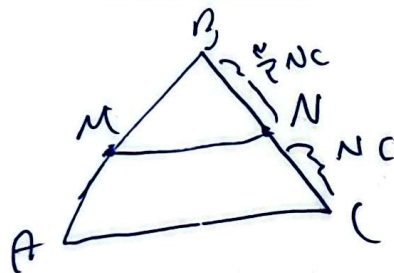


$S_{ADE} = \frac{1}{2} \times d \times u \times \sin \hat{A} = 10, 2 \sin \hat{A}$

$S_{ABC} = \frac{1}{2} \times \epsilon \times v \times \sin \hat{A} = 1 \epsilon \sin \hat{A}$

$\sin \hat{A} = \frac{1}{\sqrt{10}} = \frac{1}{\sqrt{10}}$

$S_{ADE} - S_{ABC} = 10, 2 \sin \hat{A} - 1 \epsilon \sin \hat{A} = 10, 2 \sin \hat{A} = 10, 2 \times \frac{1}{\sqrt{10}} = 10, 2 \times \frac{1}{\sqrt{10}}$



$\frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} \times \frac{1}{r} = \frac{1}{r} \times \frac{1}{r} \times \frac{1}{r}$

$\frac{1}{r} \times \frac{1}{r} + \frac{1}{r} \times \frac{1}{r} = \frac{1}{r} \times \frac{1}{r} = \frac{1}{r}$

$S_{ABC} = \frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} \times \frac{1}{r} \times \sin \hat{B} = \frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} \times \frac{1}{r} \times \sin \hat{B}$

$\frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} + \frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} = \frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} \Rightarrow \frac{1}{2} \times \frac{1}{r} \times \frac{1}{r} = \frac{1}{2} \times \frac{1}{r} \times \frac{1}{r}$

$\frac{1}{\cos \alpha} - \tan \alpha = \frac{1 + \sin \alpha}{\cos \alpha}$

$\tan \alpha = \frac{-\sin \alpha}{\cos \alpha} = \frac{-\sin \alpha}{\cos \alpha} \Rightarrow \cos \alpha = \cos \alpha$

$\cos \alpha < 0$



$\frac{|\sin \alpha|}{\cos \alpha} = \frac{-1}{\cos \alpha} \Rightarrow \frac{|\sin \alpha|}{\cos \alpha} = \frac{-\sin \alpha}{\cos \alpha} \Rightarrow |\sin \alpha| = -\sin \alpha \Rightarrow \sin \alpha < 0$