۱.

الف) $\tan\frac{11\pi}{4} + \sin\frac{15\pi}{4}\cos\frac{13\pi}{4} =$

$\tan 135 + \sin(675)\times\cos(585) = -1 + \left(-\frac{\sqrt{2}}{2}\times -\frac{\sqrt{2}}{2}\right) = -1 + \frac{1}{2} = -\frac{1}{2}$

ب) $\tan\frac{17\pi}{6}\sin\frac{11\pi}{3} + \cos\frac{10\pi}{3} =$

$\tan 150 \times \sin 300 + \cos 240 = -\frac{\sqrt{3}}{3}\times\frac{\sqrt{3}}{2} - \frac{1}{2} = \frac{3}{6} - \frac{1}{2} = 0$

۲)

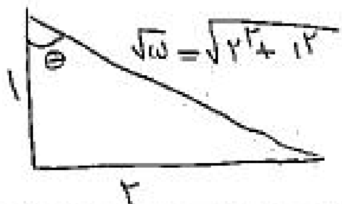
$\cot x = 4$, $\frac{\cos}{\sin} = \frac{4}{1}$

$\frac{3\cos x - \sin x}{\cos x + \sin x} = \frac{3\times 4k - 1k}{4k + 1k} = \frac{11k}{5k} = \frac{11}{5}$

۳)

$\sin\alpha = 2\cos\alpha$ (ربع سوم) $\cos\alpha = ? \rightarrow -\frac{1}{\sqrt{5}} = -\frac{\sqrt{5}}{5}$

$\tan = \frac{2\cos\alpha}{\cos\alpha} = 2$

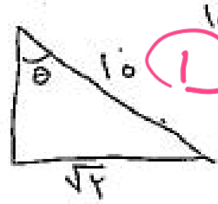


۴)

الف) $\cos\left(\frac{\pi}{2} + \frac{\pi}{4} + a\right) = \cos\left(\frac{3\pi}{4} + a\right) = \cos a + \cos\frac{3\pi}{4}$

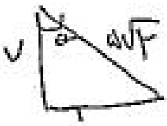
$\cos a = -\frac{7\sqrt{2}}{10}$، ربع ۲، $\sin = \frac{\sqrt{2}}{10}$

$-\frac{\sqrt{2}}{2} + \frac{-7\sqrt{2}}{10} = \frac{-12\sqrt{2}}{10} = \frac{-6\sqrt{2}}{5}$ ، $\sqrt{100 - 2} = 7\sqrt{2}$



ب) $\sin\left(\frac{13\pi}{4} + a\right) = \sin\left(3\pi + \frac{\pi}{4} + a\right) = \sin\left(\frac{5\pi}{4} + a\right) = \sin\frac{5\pi}{4} + \sin a$

$\tan = \frac{1}{7}$



$\sin a = \frac{1}{5\sqrt{2}} = \frac{\sqrt{2}}{10}$

$= -\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{10} = \frac{-4\sqrt{2}}{10} = \frac{-2\sqrt{2}}{5}$

۵)

$2\sin^2 + \cos^2 = \frac{4}{3}$

$\underbrace{\sin^2 + \sin^2 + \cos^2}_{1} = \frac{4}{3} \Rightarrow \sin^2 = \frac{1}{3}$

$\cos^2 = \frac{2}{3}$

$\tan^2 = \frac{\sin^2}{\cos^2} = \frac{\frac{1}{3}}{\frac{2}{3}} = \frac{1}{2}$

۶)

$S = 4.5 = \frac{1}{2}\times 6\times\sqrt{3}\times\sin\alpha$

$\sin\alpha = \frac{\sqrt{3}}{2} \Rightarrow \alpha \rightarrow 60,\ 120 \Rightarrow \frac{\alpha\ max}{\alpha\ min} = \frac{120}{60} = 2$

۷)

مساحت اضلاع $\rightarrow$ $2\times\frac{1}{2}\times 3k\times 2k\times\sin 150 = 6k^2\times\frac{1}{2} = 3k^2 = 54$

$k^2 = 18$ ، $k = 3\sqrt{2}$

$P = 2(2k + 3k) = 10k \Rightarrow 10\times 3\sqrt{2} = 30\sqrt{2}$

(۸

$S_{ABC} - S_{APE} = 1/75$

$5\times 7\times\frac{1}{2}\times\sin A - 7\times 4\times\frac{1}{2}\times\sin A = 1/75$

$17/5\,\sin A - 14\sin A = 1/75$

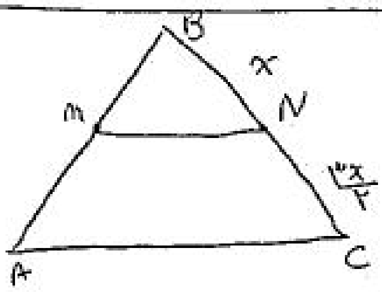
$3/5\,\sin A = 1/75$

$\sin A = \frac{1}{2} \to$ $A = 30$ درجه $\Rightarrow \tan A = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\to A = 150$ ✗

۲ ✓

(۹



$2BN = 3NC$

$BN = \frac{3}{2}NC$

$S_{ABC} = 3S_{BMN} \to \frac{1}{2}\times AB\times\frac{5x}{2}\times\sin B = \frac{1}{2}\times BM\times x\times\sin B$

$\frac{5AB}{2} = 3BM \to \frac{5}{2}(BM+AM) = 3BM$

$\frac{BM}{AM}$ $\frac{5}{4}$

۲

(۱۰

$\frac{1}{\sqrt{\cos^2\alpha}} - \tan x = \frac{1+\sin\alpha}{|\cos\alpha|} = \frac{1}{|\cos\alpha|} - \tan x = \frac{1+\sin\alpha}{|\cos\alpha|}$

$\tan\alpha = \frac{-\sin\alpha}{|\cos\alpha|} \to \cos\alpha < 0$ ۲

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

$\frac{-\sin\alpha}{\cos\alpha}$

✓ نامفهوم

۴_الف

$\cos^2\alpha = 1-\sin^2\alpha \to \cos\alpha = 1-(\frac{\sqrt{2}}{10})^2 = 1-\frac{2}{100} = \frac{98}{100} \xrightarrow[\cos\alpha<0]{\text{ناحیه ۲}} \cos\alpha = -\frac{7\sqrt{2}}{10}$

$\cos(\frac{11\pi}{4}+\alpha) = \cos(3\pi - \frac{\pi}{4}+\alpha) = -\cos(\alpha - \frac{\pi}{4})$

$-(\frac{\sqrt{2}}{2}\times\cos\alpha + \frac{\sqrt{2}}{2}\sin\alpha) = -\frac{\sqrt{2}}{2}(-\frac{7\sqrt{2}}{10} + \frac{\sqrt{2}}{10}) = -\frac{1}{\sqrt{2}}\times -\frac{6\sqrt{2}}{10} = \boxed{\frac{3}{5}}$

۴_ب

$\tan\alpha = \frac{1}{7} \to 1+\tan^2\alpha = \frac{1}{\cos^2\alpha} \to 1+\frac{1}{49} = \frac{1}{\cos^2\alpha}$

$\cos^2\alpha = \frac{49}{50} \xrightarrow[\cos\alpha>0]{\text{ناحیه اول}} \cos\alpha = \frac{7}{5\sqrt{2}}\times\frac{\sqrt{2}}{\sqrt{2}} = \frac{7\sqrt{2}}{10}$

$\sin^2\alpha = 1-\frac{49}{50} = \frac{1}{50} \xrightarrow[\sin\alpha>0]{\text{ناحیه اول}} \sin\alpha = \frac{1}{5\sqrt{2}}\times\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{10}$

$\sin(3\pi+\frac{\pi}{4}+\alpha) = -\sin(\frac{\pi}{4}+\alpha) = -(\frac{\sqrt{2}}{2}\cos\alpha + \frac{\sqrt{2}}{2}\sin\alpha)$

$-\frac{\sqrt{2}}{2}(\frac{7\sqrt{2}}{10} + \frac{\sqrt{2}}{10}) = -\frac{1}{\sqrt{2}}\times\frac{8\sqrt{2}}{10} = \boxed{-\frac{4}{5}}$