

سوال ۱) الف) $\tan(2\pi + \frac{3\pi}{4}) + \sin(\frac{11\pi}{4} + \frac{3\pi}{4}) \cos(\frac{11\pi}{4} + \frac{\pi}{4}) = -1 + (-\frac{\sqrt{2}}{4})(-\frac{\sqrt{2}}{4}) = -1 + \frac{1}{4} = -\frac{3}{4}$

ب) $\tan(\frac{11\pi}{4} - \frac{\pi}{4}) \sin(\frac{11\pi}{4} - \frac{\pi}{4}) + \cos(\frac{11\pi}{4} + \frac{\pi}{4}) = (-\frac{1}{\sqrt{2}})(-\frac{\sqrt{2}}{4}) + (-\frac{1}{4}) = \frac{1}{4} - \frac{1}{4} = 0$

سوال ۲) صورت و مخرج را به هم تقسیم می کنیم: $\frac{\frac{3\cos x}{\sin x} - \frac{\sin x}{\sin x}}{\frac{\cos x}{\sin x} + \frac{\sin x}{\sin x}} = \frac{3\cot x - 1}{\cot x + 1} \xrightarrow{\cot x = t} \frac{3(t) - 1}{(t) + 1} = \frac{11}{2}$

سوال ۳) $\sin^2 \alpha + \cos^2 \alpha = 1 \rightarrow (3\cos \alpha)^2 + \cos^2 \alpha = 9\cos^2 \alpha + \cos^2 \alpha = 10\cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = \frac{1}{10}$
 $\cos \alpha = -\frac{1}{\sqrt{10}} : \text{چون } \alpha \text{ در ربع دوم است} \rightarrow \cos \alpha = \pm \frac{1}{\sqrt{10}}$

سوال ۴) الف) $\cos \alpha = -\sqrt{1 - \sin^2 \alpha} = -\sqrt{1 - \frac{9}{100}} = -\frac{\sqrt{91}}{10}$
 $\cos(\frac{11\pi}{4} + \alpha) = \cos \frac{3\pi}{4} \cos \alpha - \sin \frac{3\pi}{4} \sin \alpha$
 $= (-\frac{\sqrt{2}}{4}) \times (-\frac{\sqrt{91}}{10}) - (+\frac{\sqrt{2}}{4}) \times (\frac{\sqrt{2}}{10}) = +\frac{\sqrt{182}}{40} - \frac{2}{40} = \frac{\sqrt{182} - 2}{40}$

ب) $\tan^2 \alpha + 1 = \frac{1}{\cos^2 \alpha} \rightarrow \frac{1}{49} + 1 = \frac{50}{49}$
 $\cos^2 \alpha = \frac{49}{50} \rightarrow \cos \alpha = \frac{7}{\sqrt{50}}$ (چون ربع دوم است) $\rightarrow \frac{\sqrt{50}}{10}$
 $\sin \alpha = +\sqrt{1 - \cos^2 \alpha} = \sqrt{1 - \frac{49}{50}} = \sqrt{\frac{1}{50}} = \frac{1}{\sqrt{50}} = \frac{\sqrt{2}}{10}$
 $\sin(\frac{11\pi}{4} + \alpha) = \sin \frac{3\pi}{4} \cos \alpha + \sin \alpha \cos \frac{3\pi}{4}$
 $= (-\frac{\sqrt{2}}{4}) \times (\frac{7}{\sqrt{50}}) + (\frac{\sqrt{2}}{10}) \times (-\frac{\sqrt{2}}{4}) = -\frac{7\sqrt{2}}{20\sqrt{50}} - \frac{2}{40} = -\frac{7\sqrt{2}}{20\sqrt{50}} - \frac{1}{20}$

سوال ۵) $2\sin^2 x + (1 - \sin^2 x) = \sin^2 x + 1 = \frac{5}{4} \rightarrow \sin^2 x = \frac{1}{4} \Rightarrow \cos^2 x = 1 - \sin^2 x = 1 - \frac{1}{4} = \frac{3}{4}$
 $\tan^2 x = \frac{\sin^2 x}{\cos^2 x} = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$

سوال ۶) $\cos = \frac{1}{4} \times \sqrt{3} \times 4 \times \sin \alpha = 3\sqrt{3} \sin \alpha = \frac{1}{4} \rightarrow \sin \alpha = \frac{1/4}{3\sqrt{3}} = \frac{1}{12\sqrt{3}} = \frac{\sqrt{3}}{36}$
 $\left. \begin{array}{l} \max : \alpha = 12^\circ \\ \min : \alpha = 4^\circ \end{array} \right\}$
 $\rightarrow \frac{12^\circ}{4^\circ} = 3$

$$r \left(\frac{1}{r} \times r a \times r a \times \frac{\sin A}{\frac{1}{r}} \right) = r a^2 = d^2 \rightarrow a = \sqrt{11} = r\sqrt{r} \quad \begin{cases} r a = 4\sqrt{r} \\ r a = 9\sqrt{r} \end{cases} \quad (\text{سوال ۷})$$

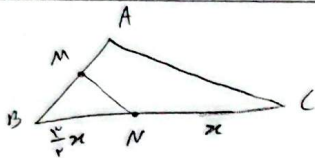
$$\frac{1}{a} = r a + r a + r a + r a = 10a \rightarrow \underline{r = 10}$$

$$S_{ABC} - S_{ADE} = 1/2 d$$

$$\frac{1}{r} \times r \times d \times \sin A - \frac{1}{r} \times r \times r \times \sin A = \frac{r d}{r} \sin A - 1 \times \sin A = r d \sin A = 1/2 d$$

$$\sin A = \frac{1}{r}$$

$$\cot^2 A + 1 = \frac{1}{\sin^2 A} \rightarrow \cot^2 A = r - 1 = 9 \rightarrow \cot A = 3 \rightarrow \tan A = \frac{1}{3}$$



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

$$S_{ABC} = r S_{BMN} \rightarrow \frac{1}{r} \times AB \times \frac{d}{r} \times \sin B = r \left(\frac{1}{r} \times BM \times \frac{r}{r} \times \sin B \right)$$

$$d AB = 9 BM \rightarrow BM = \frac{d}{9} AB$$

$$AB = BM + AM \Rightarrow \frac{d}{9} AB + AM \rightarrow AM = \frac{8}{9} AB$$

$$\frac{BM}{AM} = \frac{\frac{d}{9} AB}{\frac{8}{9} AB} = \frac{d}{8}$$

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

(سوال ۱۰)

$$\frac{|\sin \alpha|}{\cos \alpha} = -\tan \alpha \times \cos \alpha \rightarrow |\sin \alpha| = -\sin \alpha$$

یعنی $\sin \alpha$ منفی است
(اجبه ۲، ۳)

چون $\cos \alpha$ مثبت است
یعنی α در ربع اول یا دوم است
(اجبه ۲، ۳)

در نتیجه α در اجبه سوم است