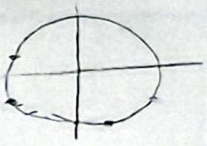
لصیا کریاسیان

«به نام خدا»

۱- الف) $(\sin 135^\circ + \sin 30^\circ)(\cos 315^\circ - \cos 150^\circ)$

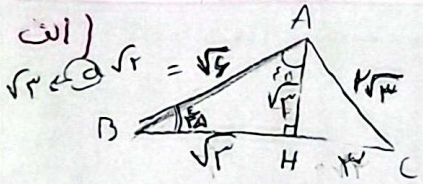


$= \left[\frac{\sqrt{2}}{2} + \left(-\frac{\sqrt{2}}{2}\right)\right]\left[\frac{+\sqrt{2}}{2} - \frac{-\sqrt{2}}{2}\right]$

$= \frac{\sqrt{1}-\sqrt{2}}{2} \times \frac{\sqrt{2}+\sqrt{2}}{2} = \frac{-1}{4}$

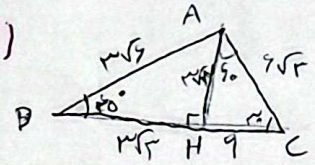
ب) $\frac{1 + 3\tan^2 210^\circ}{4\cos^2 330^\circ + 2\cos^2 225^\circ} = \frac{1+4\times\frac{1}{4}}{4\times\frac{3}{4}+2\times\frac{2}{4}} = \frac{2}{4} = \frac{1}{2}$

۲- الف)



$CH = \sqrt{12-4} = 2$

ب)



$\frac{9}{\sin 45^\circ} = \frac{AC}{\sin 30^\circ}$

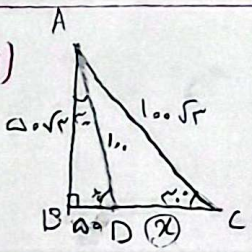
$9 = \frac{\sqrt{2}}{2} AC$

$9 \times \frac{2}{\sqrt{2}} = AC$

$9 \times \frac{2\sqrt{2}}{2} = AC \rightarrow AC = 6\sqrt{2}$

$\frac{\sin B}{6\sqrt{2}} = \frac{2\sqrt{3}}{3\sqrt{6}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \rightarrow B = 45^\circ$

۳- الف)



$BC = \frac{\sqrt{3}}{2} \times 100\sqrt{2} = 150$

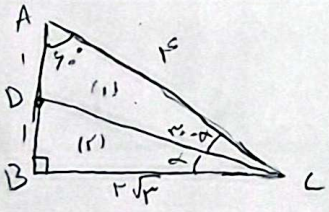
$DC = 150 - 50 = 100$

$50\sqrt{2} = \frac{\sqrt{2}}{2} AD$

$50\sqrt{2} \times \frac{2}{\sqrt{2}} = AD$

$100 = AD$

ب)

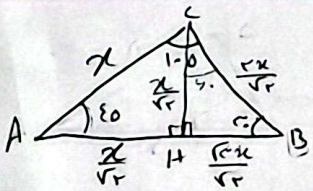


$BC = \frac{\sqrt{3}}{2} \times 4 = 2\sqrt{3}$

$DC = \sqrt{12+1} = \sqrt{13}$

$\sin\alpha = \frac{1}{\sqrt{13}} = \frac{\sqrt{13}}{13}$

۴-

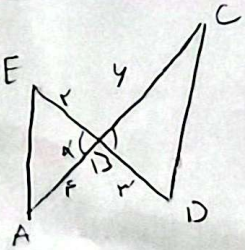


$\frac{AB}{AC} = ?$

$\frac{\frac{x(\sqrt{2}+1)}{\sqrt{2}}}{\frac{x\sqrt{2}}{2}} = \frac{\sqrt{2}+1}{\sqrt{2}}$

$\frac{\sqrt{2}}{2} \times \frac{x\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}x}{\sqrt{2}}$

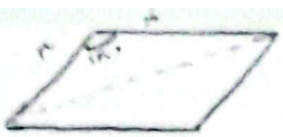
۵-



$\frac{S_{ABE}}{S_{BCD}} = \frac{\frac{1}{2}\sin\alpha \times 2 \times 4}{\frac{1}{2}\times\sin\alpha\times 3\times 6} = \frac{4}{9}$

۶-

الف)



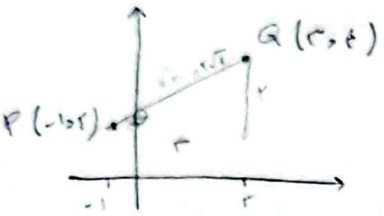
$S = 2\left(\frac{1}{2}\sin 120^\circ \times 2 \times 4\right)$

$= \frac{\sqrt{3}}{2} \times 12 = 6\sqrt{3}$

ب)

$S = 2\left(\frac{1}{2} \times \sin 120^\circ \times 3 \times 2\right) = \frac{\sqrt{3}}{2} \times 12 = 3\sqrt{3}$

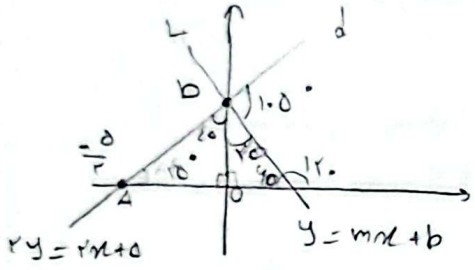
۷-



$\cos\theta = ? \quad \frac{4}{\sqrt{80}} = \frac{2\sqrt{5}}{5}$

$m = \frac{\Delta y}{\Delta x} = \frac{4-2}{2+1} = \frac{2}{3} = \frac{1}{1} = \tan\theta$

۸-



$m_b = ? \rightarrow -\sqrt{3} \times \frac{1}{10} = -\frac{\sqrt{3}}{10}$

$m = \tan 120^\circ \qquad y = -\sqrt{3}x + b$

$m = -\sqrt{3}$

$|b_0| = |A_0| = \frac{5}{2} \rightarrow b = +\frac{5}{2}$

$y = x + \frac{5}{2}$

$\hookrightarrow m = 1 \rightarrow \tan\alpha = 1 \rightarrow \alpha = 45^\circ$

۹-

$f(x) = \cos(\pi + x) + \sin\left(\frac{\pi}{2} - x\right) - \tan\left(\frac{3\pi}{2} + x\right) \qquad f\left(\frac{5\pi}{6}\right) = ?$

$f(x) = -\cos(x) + \cos(x) + \cot(x) = \cot x$

$f\left(\frac{5\pi}{6}\right) = \cot\frac{5\pi}{6} = \frac{-\sqrt{3}}{3}$

۱۰-

$$\frac{\sin\left(\frac{17\pi}{2} + x\right) + \cos\left(\frac{10\pi}{2} - x\right)}{\cos(2\pi + x) - \sin(4\pi - x)} = \frac{\sin\left(\frac{\pi}{2} + x\right) + \cos\left(\frac{2\pi}{2} - x\right)}{\cos(2\pi + x) - \sin(4\pi - x)}$$

$\frac{17\pi}{2} = \frac{16\pi + \pi}{2} = 8\pi + \frac{\pi}{2}$

$\frac{10\pi}{2} = \frac{12\pi + 2\pi}{2} = 6\pi + \frac{2\pi}{2}$

$= \frac{\cos x - \sin x}{-\cos x + \sin x} = -1$