دیانا وطن خواه

۱.

الف) $\left(\frac{\sqrt2}{2}+\left(-\frac{\sqrt3}{2}\right)\right)\left(\frac{\sqrt2}{2}-\left(-\frac{\sqrt3}{2}\right)\right)=\left(\frac{\sqrt2}{2}\right)^2-\left(-\frac{\sqrt3}{2}\right)^2=\frac{2}{4}-\frac{3}{4}=-\frac14$

ب) $\frac{1+3\left(\frac{\sqrt3}{3}\right)^2}{4\left(\frac{\sqrt3}{2}\right)^2+2\left(-\frac{\sqrt3}{2}\right)^3}=\frac{1+3\times\frac{3}{9}}{4\times\frac34+2\times\frac{3}{4}}=\frac{2}{4}=\frac12$

۲.

الف) $\sin45=\frac{\sqrt2}{2}=\frac{AH}{\sqrt6}=\sqrt{12}=2AH \rightarrow AH=\frac{2\sqrt3}{2}=\sqrt3$

$(\sqrt3)^2+HC^2=(2\sqrt3)^2 \rightarrow 3+HC^2=12 \rightarrow HC^2=9 \Rightarrow HC=3$

ب) $\tan30=\frac{AH}{\underset{9}{HC}}=\frac{\sqrt3}{3} \Rightarrow AH=\frac{9\sqrt3}{3}=3\sqrt3$

$\sin B=\frac{3\sqrt3}{3\sqrt6}=\frac{\sqrt3}{\sqrt3\sqrt2}=\frac{1}{\sqrt2}=\frac{\sqrt2}{2}\rightarrow 45$ یا $135 \rightarrow \boxed{45^\circ}$

۳.

الف) $\sin30=\frac{50\sqrt3}{AC}=\frac12 \rightarrow AC=100\sqrt3$ $\quad \tan60=\frac{50\sqrt3}{BD}=\sqrt3 \rightarrow \frac{50\sqrt3}{\sqrt3}=50$

$(50\sqrt3)^2+BC^2=(100\sqrt3)^2=30000-7500=22500+BC^2 \rightarrow BC=150 \Rightarrow x+50 \rightarrow x=100$

ب) $\tan60=\sqrt3=\frac{BC}{2}\rightarrow BC=2\sqrt3$ $\quad \sin\alpha=\frac{1}{\sqrt{13}}\Rightarrow\frac{\sqrt{13}}{13}$

$1+(2\sqrt3)^2=13\rightarrow DC^2\rightarrow DC=\sqrt{13}$

۴.

$\frac{BC}{\frac{\sqrt2}{2}}=\frac{AC}{\frac12}=\frac{AB}{\frac{\sqrt6+\sqrt2}{4}}\rightarrow\frac{AB}{AC}=\frac{\frac{\sqrt6+\sqrt2}{4}}{\frac12}=\frac{\sqrt6+\sqrt2}{2}$

$\sin105=\sin(60+45)\Rightarrow\sin60\cos45+\cos60\sin45=\frac{\sqrt3}{2}\times\frac{\sqrt2}{2}+\frac12\times\frac{\sqrt2}{2}=\frac{\sqrt6}{4}+\frac{\sqrt2}{4}=\frac{\sqrt6+\sqrt2}{4}$

۵.

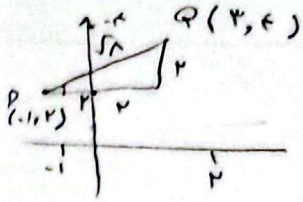
$\frac{S_{ABE}}{S_{BCD}}=\frac{\frac12\times2\times4\times\sin\alpha}{\frac12\times3\times6\times\sin\alpha}=\frac49$

۴- الف) $S = \frac{1}{2} \times 4^2 \times \sin 60 = 8 \times \frac{\sqrt{3}}{2} = 4\sqrt{3}$

ب) $S = \frac{1}{2} \times 2 \times 2\sqrt{3} \times \sin 30 = 2\sqrt{3}$

۷-

$\cos\theta = \frac{2}{\sqrt{8}} \rightarrow \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$



$x^2 + x^2 = 8^2$

$4+4=8 \rightarrow x = \sqrt{8}$

۸- $m \times b = \frac{5}{2} \times 3\sqrt{3} = \frac{5\sqrt{3}}{2}$

$y = mx + b$

$m = \tan\beta = \tan 60 = \sqrt{3}$

$\beta = 180 - (45 + 75) = 60$

$2y = 2x + 5$

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

$m = 1$ شیب

$\alpha = 45$

$x = 0 \rightarrow y = \frac{5}{2} \rightarrow y = mx + b \rightarrow \frac{5}{2} = \sqrt{3}(0) + b \Rightarrow b = \frac{5}{2}$

۹-

$f(x) = -\cos(x) + \cos(x) + \cot(x) = \cot(x) \rightarrow \cot\left(\frac{5\pi}{4}\right) = -\sqrt{3}$

۱۰-

$\frac{\cos(x) - \sin(x)}{-\cos(x) - (-\sin x)} = \frac{\cos x - \sin x}{-(\cos x - \sin x)} = -1$

$\left(\frac{17\pi}{2} + x\right) = \left(8\pi + \frac{\pi}{2} + x\right) \rightarrow \left(\sin\frac{\pi}{2} + x\right) = \cos x$