

الف) $\left(\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}\right) \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}\right) = \frac{2-2}{2} = -\frac{1}{2}$ ✓

ب) $\frac{1 + 2 \tan^2 45^\circ}{1 + \cos^2 45^\circ + \cos^2 45^\circ} = \frac{1+1}{3+1} = \frac{2}{4} = \frac{1}{2}$ ✓

$\tan^2 45^\circ = \frac{1}{1}$, $\cos^2 45^\circ = \frac{1}{2}$, $\cos^2 45^\circ = \frac{1}{2}$

الف) $AH = \frac{\sqrt{2}}{2} \times \sqrt{2} = \sqrt{2}$ } $\sin \hat{C} = \frac{AH}{AC} = \frac{1}{2} \Rightarrow \cos \hat{C} = \frac{\sqrt{3}}{2} \Rightarrow CH = AC \cos \hat{C} = 2\sqrt{2} \times \frac{\sqrt{3}}{2} = 3$ ✓
 (یعنی توانسته چون زاویه حاد است)

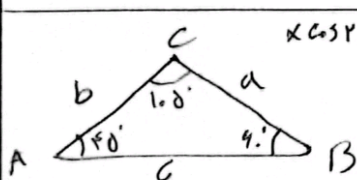
ب) $AC = \frac{CH}{\cos \hat{C}} = \frac{3}{\frac{\sqrt{3}}{2}} = 2\sqrt{3}$ $\sin \hat{C} \propto AC = \sin \hat{B} \propto AB \Rightarrow \frac{1}{2} \times 2\sqrt{3} = \sin \hat{B} \times 2\sqrt{3}$

$\Rightarrow \sin \hat{B} = \frac{1}{2} \rightarrow \left[\begin{array}{l} 30^\circ \text{ و } 150^\circ \\ 45^\circ \end{array} \right] \checkmark$ (۲)

الف) $BC = \cos 30^\circ \times AC = \frac{\sqrt{3}}{2} \times 100\sqrt{2} = 180$ } $CD = BC - BD = 180 - 80 = 100$ ✓
 $BD = \cos 60^\circ \times AD = \frac{1}{2} \times 100 = 50$
 * $AC = AB \times 2$, $AD = AB \times \frac{1}{2}$

ب) $\cos 45^\circ = \frac{1}{2} \Rightarrow AC = 4$ $\sin 45^\circ = \frac{\sqrt{2}}{2} \Rightarrow BC = 2\sqrt{2} = \sqrt{12}$

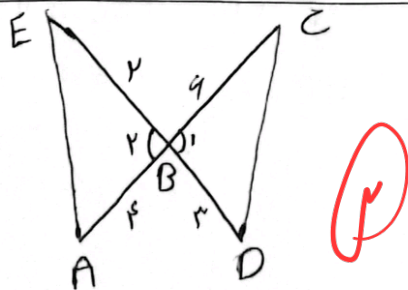
$\sqrt{2^2 + 1^2} = DC \Rightarrow DC = \sqrt{5}$ $\Rightarrow \sin \alpha = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$ ✓ (۲)



$\times \cos 40^\circ = \frac{\sqrt{2}}{2}$
 $\sin 10^\circ = \frac{1 + \cos 40^\circ}{2} \Rightarrow \sin^2 10^\circ = \frac{1 + \cos 40^\circ}{4} \Rightarrow \sin 10^\circ = \frac{\sqrt{1 + \cos 40^\circ}}{2}$
 (یعنی توانسته چون زاویه حاد است)

$\frac{c}{\sin \hat{C}} = \frac{b}{\sin \hat{B}} \Rightarrow \frac{c}{b} = \frac{\sin \hat{C}}{\sin \hat{B}} = \frac{\frac{\sqrt{1 + \cos 40^\circ}}{2}}{\frac{\sqrt{2}}{2}} = \frac{\sqrt{1 + \cos 40^\circ}}{\sqrt{2}} = \frac{\sqrt{2 + 2 \cos 40^\circ}}{2}$ ✓ (۲)

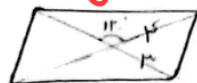
$\frac{S_{ABE}}{S_{BCD}} = \frac{\frac{1}{2} \times 4 \times 4 \times \sin \hat{B}_1}{\frac{1}{2} \times 4 \times 4 \times \sin \hat{B}_2} = \frac{4}{9}$ ✓
 $\hat{B}_1 = \hat{B}_2 \Rightarrow \sin \hat{B}_1 = \sin \hat{B}_2$



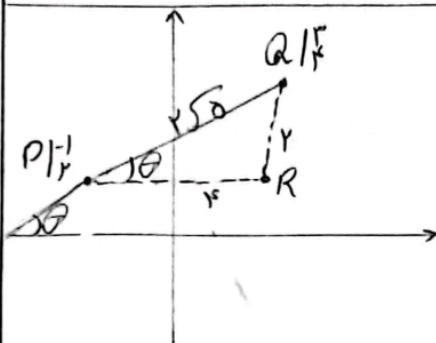
ج) $S_{\square ABCD} = r s_{\triangle AOC} = r \times r \times \sin 117^\circ = r^2 \times \frac{\sqrt{3}}{2} = 9\sqrt{3}$ ✓



ب) $S_{\square} = \frac{1}{2} \times r \times r \times \sin 117^\circ = \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$ ✓



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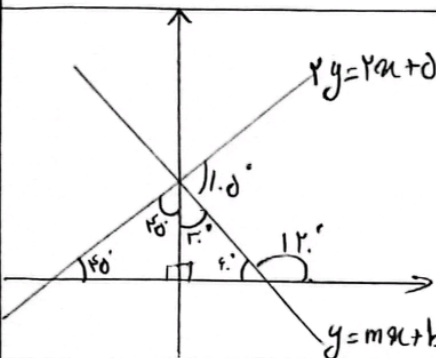


$PQ = r + 19 \Rightarrow PQ = \sqrt{r^2} = r\sqrt{2}$

$\cos \theta = \frac{PR}{PQ} = \frac{r}{r\sqrt{2}} = \frac{1}{\sqrt{2}}$ ✓

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$y = 2x + 0 \Rightarrow y = 2x + \frac{0}{2} \Rightarrow \text{نقطه} = 1 \Rightarrow \text{مختصات} = 1, 0$
 $\text{نقطه} = \frac{0}{2} \Rightarrow b = \frac{0}{2}$

$m = \tan 117^\circ = -\sqrt{3}$

$\Rightarrow mb = -\frac{2\sqrt{3}}{2}$ ✓

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$f(x) = \cos(\pi + x) + \sin(\frac{\pi}{2} - x) - \tan(\frac{\pi}{4} + x)$

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

$f(\frac{5\pi}{4}) = \cot(\frac{5\pi}{4}) = -\sqrt{3}$ ✓

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$\frac{\sin(\frac{\pi}{4} + 2x) + \cos(\frac{\pi}{4} - 2x)}{\cos(\pi + 2x) - \sin(\frac{\pi}{4} - 2x)} = \frac{\cos 2x - \sin 2x}{-\cos 2x + \sin 2x} = \frac{\cos 2x - \sin 2x}{-(\cos 2x - \sin 2x)} = -1$ ✓

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