مربیان دهقانی

۱- الف) $(\sin 135 + \sin 300)(\cos 315 - \cos 150)$ $\rightarrow \sin 135 = \frac{\sqrt{2}}{2} / \cos 150 = -\frac{\sqrt{3}}{2}$

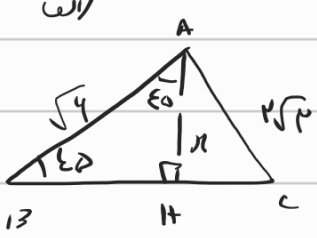
$\cos 315 = \frac{\sqrt{2}}{2} / \sin 300 = -\frac{\sqrt{3}}{2}$

$\left(\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{2}\right)\left(-\frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2}\right) = \left(-\frac{\sqrt{2}}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{2}{4} - \frac{3}{4} = -\frac{1}{4}$

ب) $\frac{1 + 3\tan^2 210}{4\cos^2 330 + \cos^2 225} = ?$ $\quad 3\tan^2 210 = 3\left(\frac{1-\cos 60}{1+\cos 60}\right) = 3\left(\frac{1-\frac{1}{2}}{1+\frac{1}{2}}\right) = 3\left(\frac{1}{3}\right) = 1$

$\rightarrow \frac{2}{\left(\frac{\sqrt{3}}{2}\right)^2 \times 4 - \frac{1}{2}} = \frac{1+1}{3+1} = \frac{1}{2}$

۲- الف)



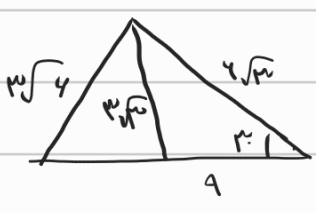
$x^2 + x^2 = (\sqrt{4})^2$

$2x^2 = x^2 = 3 \rightarrow x = \sqrt{3}$

$AH = \sqrt{3}$ $\quad (2\sqrt{3})^2 - (\sqrt{3})^2 = 4 \times 3 - 3 = 12 - 3 = 9 \rightarrow \sqrt{9} = 3$

$HC = 9$

ب)

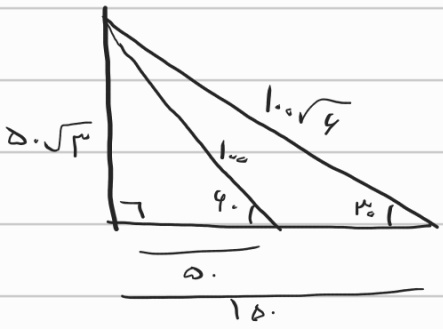


$\cos 30 = \frac{CH}{AC} = \frac{9}{AC} = \frac{\sqrt{3}}{2} \rightarrow AC = \frac{18}{\sqrt{3}} = \frac{18\sqrt{3}}{3} = 4\sqrt{3}$

$(4\sqrt{3})^2 - 9^2 = 108 - 81 = 27 \rightarrow \sqrt{27} = 3\sqrt{3}$

$\sin B = \frac{AH}{AB} = \frac{3\sqrt{3}}{3\sqrt{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2} \rightarrow \sin 45$

۳- الف)



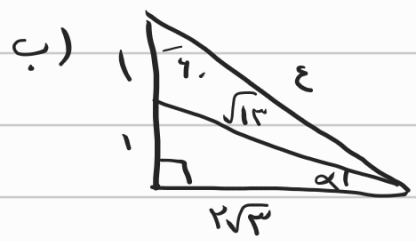
$\sin 30 = \frac{AB}{AC} = \frac{50\sqrt{3}}{AC} = \frac{1}{2} \rightarrow AC = 100\sqrt{3}$

$(100\sqrt{3})^2 - (50\sqrt{3})^2 = 30000 - 7500 = 22500$

$\sqrt{22500} = \sqrt{50} = 50$ $\quad x = 150 - 50 = 100$

$\cos 60 = \frac{AB}{AC} = \frac{2}{AC} = \frac{1}{2} \Rightarrow AC = 4$

ب)



$4^2 - 2^2 = 16 - 4 = 12 \rightarrow \sqrt{12} = 2\sqrt{3}$

$12 + (2\sqrt{3})^2 = 1 + 12 = 13 \rightarrow \sqrt{13}$

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

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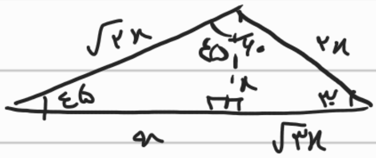


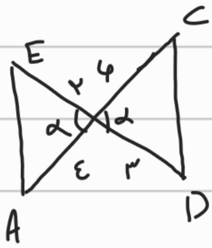
$(2x)^2 - x^2 = 4x^2 - x^2 = 3x^2 \to \sqrt{3x^2} = \sqrt{3}\,x$

$x^2 + x^2 = 2x^2 \to \sqrt{2x^2} = \sqrt{2}\,x$

$\frac{AB}{AC} = \frac{x + \sqrt{3}x}{\sqrt{2}\,x} = \frac{x(1+\sqrt{3})}{x\sqrt{2}} = \frac{1+\sqrt{3}}{2}$

$\frac{AB}{AC} = \frac{1+\sqrt{3}}{2}$

۵ـ



$S_{\widehat{ABD}} = \frac{1}{2} \times 2 \times 4 \times \sin\alpha = 4\sin\alpha$

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

$\frac{4\sin}{9\sin\alpha} = \frac{4}{9}$

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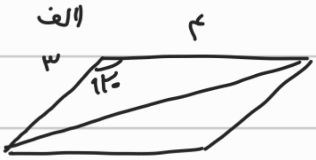
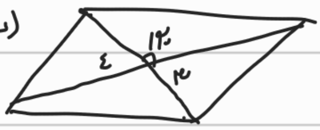
الف



$\frac{1}{2} \times 3 \times 4 \times \sin 120 = \frac{12}{2}\sin 120 = \frac{6\sqrt{3}}{2}$

$3\sqrt{3} \times 2 = 9\sqrt{3}$

ب)



$\frac{1}{2} \times 3 \times 4 \times \sin 120 = 6 \times \frac{\sqrt{3}}{2} = 3\sqrt{3}$

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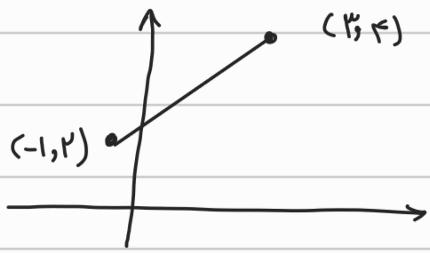
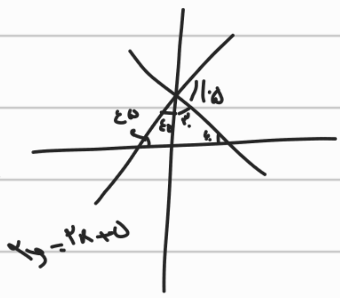


$\text{شیب} = \frac{\Delta y}{\Delta x} = \frac{4-2}{3-(-1)} = \frac{2}{4} = \frac{1}{2}$

$\tan\alpha = \frac{1}{2}$ $\quad 1 + \tan^2\alpha = \frac{1}{c^2\alpha} \to 1 + \frac{1}{4} = \frac{5}{4} \to \frac{1}{c^2\alpha}$

$c\alpha = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$ $\quad c^2\alpha = \frac{4}{5} \to c\alpha = \frac{2}{\sqrt{5}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

۸ـ



$2y = 2x + 5 \to y = x + 2{,}5$ $\quad \tan 120 = \frac{\sin 120}{\cos 120} = \frac{\frac{\sqrt{3}}{2}}{\frac{-1}{2}} = -\sqrt{3}$

$\tan\alpha = 1 \to \alpha = 45$

$y = mx + b \to m = -\sqrt{3}$

$y = x + 2{,}5 \to y = 2{,}5$

$y = -\sqrt{3}x + b \to \frac{5}{2} = 0 + b \to b = \frac{5}{2}$

$mb = \frac{-5\sqrt{3}}{2} = -2{,}5\sqrt{3}$

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

$\cos(\pi + x) = -\cos x$

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

$\tan\left(\frac{3\pi}{2} + x\right) = -\cot x$

$f(x) = \cot x$

$f\left(\frac{5\pi}{6}\right) = f(150^\circ) = \cot 150^\circ = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$

$\cot 150^\circ = -\sqrt{3}$

$$\frac{\sin\left(\frac{17\pi}{2} + x\right) + \cos\left(\frac{15\pi}{2} - x\right)}{\cos(3\pi + x) - \sin(4\pi - x)}$$

$\sin\left(\frac{17\pi}{2} + x\right) = \sin\frac{17\pi}{2}\cos x + \sin x \cos\frac{17\pi}{2}$ $\quad \cos\left(\frac{17\pi}{2}\right) = \cos\left(\frac{\pi}{2}\right) = 0$

$\sin\left(\frac{17\pi}{2}\right) = \sin\left(\frac{\pi}{2}\right) = 1 \rightarrow 1 \times \cos x + 0 \times \sin x = \cos x$

$\cos(3\pi + x) = \cos(\pi + x) = -\cos x$ / $\sin(4\pi - x) = \sin(2\pi - x) = -\sin x$

$\cos\left(\frac{15\pi}{2} - x\right) = \cos\frac{15\pi}{2}\cos x + \sin\frac{15\pi}{2}\sin x$ / $\cos\frac{15\pi}{2} = \cos\left(\frac{12\pi}{2} + \frac{3\pi}{2}\right) = \cos\left(4\pi + \frac{3\pi}{2}\right) = \cos\frac{3\pi}{2} = 0$

$\sin\frac{15\pi}{2} = \sin\left(\frac{12\pi}{2} + \frac{3\pi}{2}\right) = \sin\frac{3\pi}{2} = -1$

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