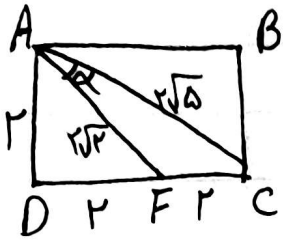
Subject: تکلیف شماره ۲۷ یازدهم — ۲۰ — سید آرین میرتقوی

$S=\frac{1}{2}AB\sin\alpha \Rightarrow 9=4\sqrt{3}\sin\alpha$ (۲) (۱)

$\Rightarrow \sin\alpha=\frac{\sqrt{3}}{2} \begin{cases} \rightarrow \alpha=\frac{\pi}{3} \\ \rightarrow \alpha=\frac{2\pi}{3} \end{cases} \frac{\frac{2\pi}{3}}{\frac{\pi}{3}}=2$



(۲) (۲)

$AC=\sqrt{4+16}=2\sqrt{5}$ ، $AF=2\sqrt{2}$

قضیه کسینوس‌ها $\Rightarrow 4=8+20-8\sqrt{10}\cos\alpha$

$\cos\alpha=\frac{3}{\sqrt{10}} \rightarrow$  $\Rightarrow \cot\alpha=3$

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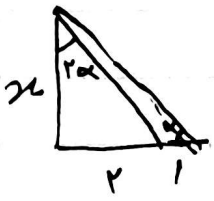
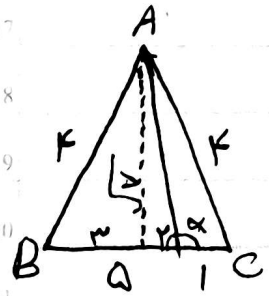
(۲) (۳)



$\Rightarrow \tan 2\alpha=\frac{2\tan\alpha}{1-\tan^2\alpha}=\frac{2}{x}$ (۱)

$\tan\alpha=\frac{x}{3} \Rightarrow$ (۱) $\rightarrow \frac{2x}{\frac{9-x^2}{3}}=\frac{6x}{9-x^2}=\frac{2}{x}$

$8x^2=18 \Rightarrow x=\sqrt{\frac{9}{4}}=\frac{3}{2} \Rightarrow \cot\alpha=\frac{3}{2}=2$



(۲) (۴)

$\tan(\pi-\alpha)=-\tan\alpha=\frac{\sqrt{7}}{2}$

$\tan\alpha=-\frac{\sqrt{7}}{2}$

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(۵)

$2\sin^2 x+\cos^2 x \Rightarrow \sin^2 x+\sin^2 x+\cos^2 x=\frac{4}{3}$ (۲)

$\Rightarrow \sin^2 x=\frac{1}{3}$ (۱) $\Rightarrow \cos^2 x=1-\frac{1}{3}=\frac{2}{3}$ (۲)

(۱)، (۲) $\rightarrow \tan^2 x=\frac{\frac{1}{3}}{\frac{2}{3}}=\frac{1}{2}$

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۶) $\frac{\sin^4\alpha+\sin^2\alpha-\cos^4\alpha-\cos^2\alpha+2\cos^2\alpha-2\sin^2\alpha}{(\sin^2\alpha+\cos^2\alpha)^2-\sin^2\alpha\cos^2\alpha}$ (۲) (۹)

$\sin^2\alpha\cos^2\alpha = 1-\cos\alpha\sin^2\alpha$

$\Rightarrow \frac{(\sin^2\alpha-\cos^2\alpha)+2(\cos^2\alpha-\sin^2\alpha)+(\sin^2\alpha-\cos^2\alpha)(1-\cos^2\alpha\sin^2\alpha)}{2+\sin^2\alpha\cos^2\alpha}$

$\Rightarrow \frac{(2+\sin^2\alpha\cos^2\alpha)(\sin^2\alpha-\cos^2\alpha)}{(2+\sin^2\alpha\cos^2\alpha)} = \cos^2\alpha-\sin^2\alpha = \boxed{\cos 2\alpha}$

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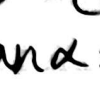
۷) $\sin(\frac{9\pi}{2}+\alpha)\cos(\frac{7\pi}{2}-\alpha)-\tan(\alpha-\frac{3\pi}{2})$ (۲) (۷)

$\Rightarrow -\cos\alpha\sin\alpha+\cos\alpha$

$\tan\alpha=\frac{4}{3} \Rightarrow$  $\overset{\text{فیثاغورس}}{\Rightarrow} -(\frac{-3}{5})(\frac{-4}{5})+\frac{3}{4} = 0.17$

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۸) $2\cos\frac{5\pi}{12}+\sqrt{2}(\sin\frac{\pi}{12}-\cos\frac{\pi}{12})$ (۲) (۸)

$\Rightarrow \frac{3}{2}+\sqrt{2}(\sqrt{2}\sin(\frac{\pi}{12}-\frac{\pi}{4})) = \frac{3}{2}-2\sin\frac{\pi}{4} = \frac{3}{2}-1 = \frac{1}{2}$

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۹) $\tan(\alpha) = \frac{2\times\frac{1}{4}}{1-(\frac{1}{4})^2} = \frac{\frac{2}{4}}{\frac{15}{16}} = \frac{4}{15}$ →  (۲) (۹)

$\frac{\frac{8}{15}-\frac{1}{17}}{\frac{8}{17}-\frac{15}{17}} = \boxed{\frac{-14}{105}}$

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۱۰) $2\sin\alpha < 2\sin\alpha\cos\alpha \Rightarrow \sin\alpha\cos\alpha-\sin\alpha > 0$ (۲) (۱۰)

$0 < \sin\alpha(\underbrace{\cos\alpha-1}_{-}) \Rightarrow \sin\alpha < 0 \overset{①}{\Rightarrow} 0 < \frac{\cot\alpha}{\sin\alpha} \Rightarrow \cot\alpha < 0 \overset{②}{}$

①,② →  $< \alpha <$