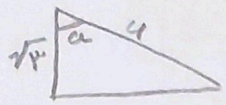
نام و نام خانوادگی: سانا زرفام | مقطع: یازدهم رشته C | تمارین تکلیف: ۲۷

سوال ۱

$\triangle ABC$ اضلاع: $\sqrt{3}$, 4 زاویه بین آن‌ها a $S_{\triangle ABC}: 1.5$ بیشترین مقدار a = a_{min} چند برابر

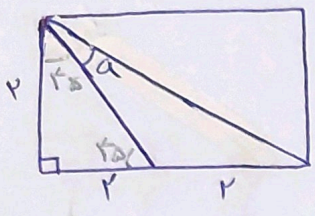


$$\Rightarrow S_{\triangle ABC} = 4\times\sqrt{3}\times\frac{1}{2}\times\sin a \rightarrow 4\times\sqrt{3}\times\frac{1}{2}\times\sin a = 1.5 \rightarrow$$

$$\sin a = \frac{\sqrt{3}}{2} \rightarrow \begin{cases}\max a = 120^\circ\\ \min a = 60^\circ\end{cases} \Rightarrow$$

بیشترین مقدار a ۲ برابر کمترین مقدار a

سوال ۲



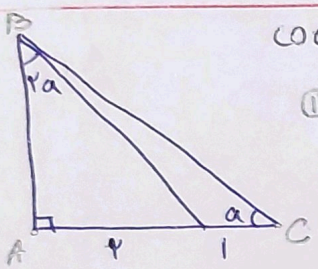
$\cot a = ?$

$$\cot\left(\frac{\pi}{4}+a\right)=\frac{1}{3} \rightarrow \tan\left(\frac{\pi}{4}+a\right)=3 \rightarrow \frac{1+\tan a}{1-\tan a}=3$$

$$\rightarrow 3-3\tan a = 1+\tan a \rightarrow 1 = 4\tan a \rightarrow \tan a = \frac{1}{4}$$

$$\Rightarrow \cot a = 4$$

سوال ۳



$\cot a = ?$

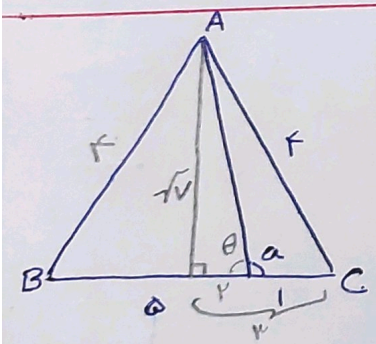
① $0 < a < 90 \Rightarrow \tan a, \cot a > 0$

$$\frac{2}{AB} = \tan 2a \rightarrow \frac{2}{\tan 2a} = AB \;,\; \frac{AB}{3} = \tan a$$

$$\Rightarrow \frac{2}{3}\,\frac{1}{\tan 2a} = \tan a \rightarrow \frac{2}{3}\times\frac{1-\tan^2 a}{2\tan a} = \tan a \Rightarrow 1 = 4\tan^2 a$$

$$\Rightarrow \tan a = \pm\frac{1}{2} \xrightarrow{①} \tan a = \frac{1}{2} \Rightarrow \cot a = 2$$

سوال ۴



ABC مساوی‌الساقین $\tan a = ?$

$$\theta = 180^\circ - a$$

$$\tan\theta = \frac{\sqrt{7}}{2} \rightarrow \tan(\pi - a) = \frac{\sqrt{7}}{2} \rightarrow -\tan a = \frac{\sqrt{7}}{2} \rightarrow$$

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

سوال ۵

$2\sin^2 x + \cos^2 x = \frac{4}{3}$ $\quad \tan^2 x = ?$ $\quad$ (1) (2) $\Rightarrow \tan^2 x = \frac{\sin^2 x}{\cos^2 x} = \frac{\frac{1}{3}}{\frac{2}{3}} = \frac{1}{2}$

$$\sin^2 x + 1 = \frac{4}{3} \Rightarrow \sin^2 x = \frac{1}{3} \quad (1)$$

$$\sin^2 x + \cos^2 x = 1 \xrightarrow{(1)} \cos^2 x = \frac{2}{3} \quad (2)$$

سوال ۶

$$\frac{\sin^4 a + 4\cos^2 a}{1+\cos^2 a} - \frac{\cos^4 a + 4\sin^2 a}{1+\sin^2 a} = 1+\cos^2 a - (1+\sin^2 a) = \cos^2 a - \sin^2 a = \boxed{\cos 2a}$$

$$\sin^4 a + 4(1-\sin^2 a) = \sin^4 a - 4\sin^2 a + 4 = (\sin^2 a - 2)^2 = (1-\cos^2 a - 2)^2 = (-1-\cos^2 a)^2 = (1+\cos^2 a)^2$$

$$\cos^4 a + 4(1-\cos^2 a) = \cos^4 a - 4\cos^2 a + 4 = (\cos^2 a - 2)^2 = (1-\sin^2 a - 2)^2 = (-1-\sin^2 a)^2 = (1+\sin^2 a)^2$$

سوال ۷

$\tan a = \frac{4}{3}$ انتهای کمان a ربع سوم

$$\sin\left(\frac{9\pi}{2}+a\right)\cos\left(\frac{7\pi}{2}-a\right) - \tan\left(a-\frac{3\pi}{2}\right) = ?$$

$\sin\left(\frac{9\pi}{2}+a\right) = \cos a$

$\cos\left(\frac{7\pi}{2}-a\right) = -\sin a$

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

$\tan a = \frac{4}{3} \rightarrow \cos a = -\frac{3}{5}$ ، $\sin a = -\frac{4}{5}$

$$\Rightarrow \left(-\frac{3}{5}\times\frac{4}{5}\right) - \frac{3}{4} = -\frac{12}{25} - \frac{3}{4} = \boxed{\frac{-123}{100}}$$

سوال ۸

$$\left(2\cos 4x + \sqrt{2}\sin x - \sqrt{2}\cos x\right) \xrightarrow{x=\frac{\pi}{12}} ? = \frac{3}{2} - 1 = \boxed{\frac{1}{2}}$$

$$\rightarrow \left(2\cos\frac{4\pi}{12} + \sqrt{2}\sin\frac{\pi}{12} - \sqrt{2}\cos\frac{\pi}{12}\right)$$

$\frac{4\pi}{12} = \frac{\pi}{3}$

$2\times\frac{1}{2} = 1$

$\sqrt{2}\left(\sqrt{2}\sin\left(\frac{\pi}{12}-\frac{\pi}{4}\right)\right)$ ، $\frac{\pi}{4} = \frac{3\pi}{12}$

$-2\sin\frac{\pi}{6} = -1$

سوال ۹

$\tan\left(\frac{a}{2}\right) = \frac{1}{4}$ $\qquad \frac{\tan a - \sin a}{\sin a - \cos a} = ?$

$$\tan a = \frac{2\times\frac{1}{4}}{1-\frac{1}{16}} = \frac{8}{15} \rightarrow \begin{cases}\sin a = \frac{8}{17}\\ \cos a = \frac{15}{17}\end{cases}$$

$$\frac{\tan a - \sin a}{\sin a - \cos a} = \frac{\frac{8}{15} - \frac{8}{17}}{\frac{8}{17} - \frac{15}{17}} = \frac{\frac{2\times 8}{15\times 17}}{\frac{-7}{17}} = \boxed{\frac{-16}{105}}$$

سوال ۱۰

کدام ربع؟ انتهای کمان a

$2\sin a < \sin 2a$ (۲) ، $0 < \frac{\cot a}{\sin a}$ (۱)

(۱) $\rightarrow \frac{\frac{\cos a}{\sin a}}{\sin a} > 0 \rightarrow \frac{\cos a}{\sin^2 a} > 0 \Rightarrow \cos a > 0$

همواره نامنفی

(۲) $\rightarrow 0 < 2\sin a\cos a - 2\sin a \rightarrow 0 < 2\sin a(\cos a - 1) \Rightarrow 0 > \sin a$

$\cos a - 1$ از (۱)

$0 < \cos a \leq 1 \Rightarrow$ همواره نامثبت

جواب!