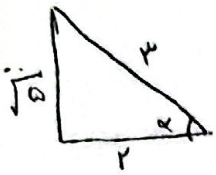
$\cos\alpha = \frac{2}{3}$ ، ربع چهارم $\qquad \dfrac{\sin(\frac{\pi}{2}+\alpha) - \sin(\alpha-\pi)}{|\tan^2\alpha - 1|} = \dfrac{\cos\alpha + \sin\alpha}{|\tan^2\alpha - 1|}$



$\cos\alpha = \frac{2}{3}$

$\tan\alpha = -\frac{\sqrt{5}}{2}$

$\sin\alpha = -\frac{\sqrt{5}}{3}$

$\rightarrow \dfrac{\frac{2}{3} - \frac{\sqrt{5}}{3}}{|\frac{5}{4} - \frac{4}{4}|} = \dfrac{\frac{2-\sqrt{5}}{3}}{\frac{1}{4}} = \dfrac{8-4\sqrt{5}}{3}$ ۶

$\sin\alpha = 2\cos\alpha \qquad \alpha =$ در ربع سوم $\qquad \cos\alpha = -\frac{1}{\sqrt{5}}$

$\sin^2\alpha + \cos^2\alpha = 1 \longrightarrow 4\cos^2\alpha + \cos^2\alpha = 1 \rightarrow 5\cos^2\alpha = 1 \rightarrow \cos\alpha = +\frac{1}{\sqrt{5}}$ ✗

$\cos\alpha = -\frac{1}{\sqrt{5}}$ ✓ در ربع سوم ۷

$2mx + (m^2-1)y = 3 \rightarrow y = -\frac{2m}{m^2-1}x + \frac{3}{m^2-1}$

$\tan 60 = \sqrt{3} \longrightarrow -\frac{2m}{m^2-1} = \sqrt{3} \longrightarrow \sqrt{3}m^2 - \sqrt{3} = -2m \longrightarrow \sqrt{3}m^2 + 2m - \sqrt{3} = 0 \quad \Delta = 16 \quad \frac{-2 \pm 4}{2\sqrt{3}} \begin{cases} m_1 = \frac{1}{\sqrt{3}} \\ m_2 = -\frac{3}{\sqrt{3}} \end{cases}$ ۸

اختلاف m ها $= \frac{1}{\sqrt{3}} - (-\frac{3}{\sqrt{3}}) = \frac{4}{\sqrt{3}}$

$-\frac{\pi}{4} < x < \frac{\pi}{4} \qquad \tan(\frac{\pi}{4} - x) = \frac{1-m}{2+m} \rightarrow \tan\alpha = \frac{1-m}{2+m}$

$-1 < \tan x < 1 \longrightarrow -1 < \underbrace{\frac{1-m}{2+m}} < 1 \qquad \Rightarrow D = (-2, -\frac{1}{2})$ ۹

$\frac{-2}{-\,|\,+} \quad \frac{3}{2+m} > 0 \leftarrow 0 < \frac{2+m+1-m}{2+m} \qquad \frac{1-m-2-m}{2+m} < 0 \rightarrow \frac{-1-2m}{2+m} < 0 \rightarrow \frac{-2 \quad -\frac{1}{2}}{-\,|\,+\,|\,-}$

$\tan(300^\circ)\cos(210^\circ) + \tan(480^\circ)\sin(840^\circ)$ $\qquad 480 = 360 + 120$

$(-\sqrt{3}) \times (-\frac{\sqrt{3}}{2}) + (-\sqrt{3})(\frac{\sqrt{3}}{2}) = 0$ $\qquad \tan(480) = \tan(120)$ ۱۰

$840 = (2 \times 360) + 120$

$\sin(840) = \sin(120)$

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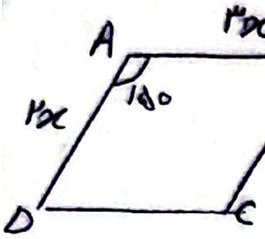
S متوازی الاضلاع : ۵۴

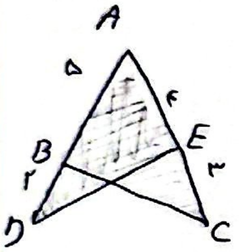


$S_{ABCD} = AB \times AD \times \underbrace{\sin 150}_{\frac{1}{2}} = 3x \times 2x \times \frac{1}{2} = 3x^2 = 54 \to x = \sqrt{18}$

محیط $= 2(2x + 3x) = 10x \longrightarrow \boxed{10\sqrt{18}}$

۲

$S_{ABC} - S_{ADE} = 1{,}75 \qquad \tan\hat{A} =$

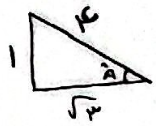


$S_{ABC} = 5 \times (4+3) \times \sin\hat{A} = 35\sin\hat{A}$

$S_{ADE} = 4 \times (5+2) \times \sin\hat{A} = 28\sin\hat{A}$

$\xrightarrow{-} 35\sin\hat{A} - 28\sin\hat{A} = 7\sin\hat{A}$ ①

① $\Rightarrow 7\sin\hat{A} = 1{,}75 \to \sin\hat{A} = \frac{1}{4}$



$\Rightarrow \tan\hat{A} = \frac{1}{\sqrt{3}}$

۳

$\sqrt{\frac{1}{\cos^2\alpha}} - \tan\alpha = \frac{1+\sin\alpha}{|\cos\alpha|} \to \frac{1}{|\cos\alpha|} - \frac{\sin}{\cos\alpha}$

$\xrightarrow{\cos>0} \frac{1-\sin\alpha}{\cos\alpha} \neq \frac{1+\sin\alpha}{|\cos\alpha|}$

$\xrightarrow{\cos<0} \frac{-1+\sin\alpha}{\cos\alpha} = \frac{1+\sin\alpha}{-\cos} \Rightarrow \cos<0$ ①

$\frac{|\sin\alpha|}{\cos\alpha} = -\frac{1}{\cot\alpha} \to \frac{|\sin\alpha|}{\cos\alpha} = -\tan$

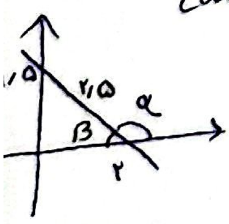
$\xrightarrow{\sin>0} \frac{\sin}{\cos} = \tan x$

$\xrightarrow{\sin<0} \frac{-\sin}{\cos} = -\tan \Rightarrow \sin<0$ ②

$\boxed{\text{①,② } \Leftarrow \alpha \text{ در ناحیه سوم است}}$

۴

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



$\hat{\alpha} + \hat{\beta} = 180 \Rightarrow \sin\hat{\beta} = \sin\hat{\alpha} \to \frac{1{,}5}{2{,}5} = \frac{3}{5}$ ①

$\Rightarrow \cos\beta = -\cos\alpha \to \frac{-2}{2{,}5} = -\frac{4}{5}$ ②

★ زاویه های مکمل: $\sin\alpha = \sin\beta$ ، $\cos\alpha = -\cos\beta$

① ,② $\Rightarrow \cot\alpha = \frac{-\frac{4}{5}}{\frac{3}{5}} = -\frac{4}{3}$

۵

$\frac{3\cos(248) - 2\sin(158)}{\sin(202) - \cos(292)} = \frac{3\cos(360-112) - 2\sin(270-112)}{\sin(90+112) - \cos(180+112)} = \frac{3\cos(112) - 2\cos(112)}{\cos(-112) - (-\cos(112))}$

$= \frac{3\cos(112) - 2\cos(112)}{\cos(112) + \cos(112)} = \frac{\cancel{\cos(112)}}{2\cancel{\cos(112)}} = \frac{1}{2}$