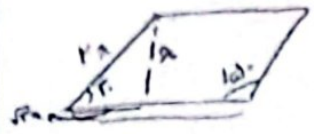
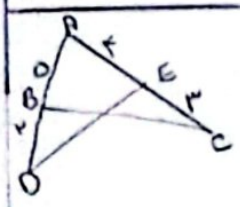
(۱)



$S = 2x \times 3x \times \sin 30 = 6 \rightarrow \frac{9x^2}{2} = 6 \rightarrow x = \sqrt{12}$

$P = 10x \xrightarrow{x=\sqrt{12}} 10\sqrt{12} = \boxed{20\sqrt{3}}$

(۲)



$S_{ABC} - S_{ADE} = \frac{\sin A}{2}(5 \times 7) - \frac{\sin A}{2}(4 \times 3) = 17.5$

$\frac{7 \sin A}{2} = \frac{7}{4} \rightarrow \sin A = \frac{1}{2} \sim A = 30^\circ \sim \tan 30^\circ = \frac{\sqrt{3}}{3}$

$\cos A^2 + \frac{1}{4} = 1 \rightarrow \cos = \frac{\sqrt{3}}{2} \rightarrow \tan A = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{\sqrt{3}}{3}$

(۳)

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

  $\sqrt{\cos^2 \alpha} \rightarrow |\cos \alpha|$

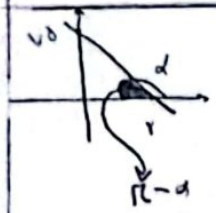
  $\rightarrow \cos \alpha < 0$

- $\frac{|\sin \alpha|}{\cos \alpha} = \frac{-1}{\cot \alpha} \rightarrow \frac{|\sin \alpha|}{\cos \alpha} = \frac{-\sin \alpha}{\cos \alpha} \rightarrow \sin < 0$

  $\cot \alpha \rightarrow \frac{\cos \alpha}{\sin \alpha}$

ناحیه سوم

(۴)



$\tan\left(\frac{\pi}{2} - \alpha\right) = -\cot(\alpha) \xrightarrow{\tan \cdot \cot = 1} \boxed{-\frac{4}{3}}$

$\tan = -\frac{3}{4}$

(۵)

$\frac{3\cos(228) - 2\sin(150)}{\sin(202) - \cos(292)} = \frac{-3\cos(40) - 2\sin(22)}{-\sin(22) - \cos(48)} \xrightarrow{\cos(48) = \sin(42)}$

$\frac{5}{2} \frac{\sin(22)}{\sin(22)} = 2.5$

۱۶

$\cos x = \frac{۲}{۳}$ ، $\sin(\frac{\pi}{۲}+\alpha) = \cos\alpha$ ، $\sin(\alpha-\pi) = -\sin(\pi-\alpha) = -\sin\alpha$

$1+\tan^۲\alpha = \frac{۱}{\frac{۴}{۹}} = \frac{۹}{۴} \to \tan^۲ = \frac{۵}{۴}$ ، $\sin^۲ + \frac{۴}{۹} = ۱ \to \sin = \frac{\sqrt{۵}}{۳}$

$$\to \frac{\sin(\frac{\pi}{۲}+\alpha) - \sin(\alpha-\pi)}{|\tan^۲\alpha - ۱|} = \frac{\cos\alpha + \sin\alpha}{\frac{۱}{۴}} = \frac{\frac{۲+\sqrt{۵}}{۳}}{\frac{۱}{۴}} = \frac{۸+۴\sqrt{۵}}{۳}$$

($|\tan^۲\alpha - ۱| \to \frac{۱}{۴}$)

۱۷

$\sin\alpha = ۲\cos\alpha$ ، ربع ۳ α

$\to y^۲ = ۵x^۲ \to y = \sqrt{۵}x \to \cos\alpha = \frac{x}{\sqrt{۵}x} = \frac{\sqrt{۵}}{۵}$ ربع ۳ $\to -\frac{\sqrt{۵}}{۵}$

۱۸

$\underbrace{۲m}_{a}x + (\underbrace{m^۲-۱}_{b})y \underbrace{-۳}_{c} = ۰$ ، ~~$\tan\theta = ۶۰$~~ $\tan\theta = \frac{-a}{b} = \frac{-۲m}{m^۲-۱} = \sqrt{۳}$

$\to \sqrt{۳}m^۲ - \sqrt{۳} = -۲m \to \sqrt{۳}m^۲ + ۲m - \sqrt{۳} \xrightarrow{\div\sqrt{۳}} m^۲ + \frac{۲}{\sqrt{۳}}m - ۱ = ۰ \to m = -\frac{۱}{\sqrt{۳}}$ یا $\frac{۱}{\sqrt{۳}}$

$\to \frac{۱}{\sqrt{۳}} - (\frac{-۱}{\sqrt{۳}}) = \frac{۴\sqrt{۳}}{۳}$ ($-\frac{۲\sqrt{۳}}{۳}$ ، $\frac{\sqrt{۳}}{۲}$)

۱۹

$-\frac{\pi}{۴} < x < \frac{\pi}{۴} \to -\frac{\pi}{۴} < -x < \frac{\pi}{۴} \xrightarrow{+\frac{\pi}{۲}} ۰ < \frac{\pi}{۴} - x < \frac{\pi}{۲} \to \tan ۰ < \tan(\underbrace{\frac{\pi}{۴}-x}_{\frac{۱-m}{۲+m}}) < \tan\frac{\pi}{۲}$ (۱)

$\to \frac{۱-m}{۲+m} < ۱$ ← همواره برقرار است

$\to \frac{۱-m}{۲+m} > ۰ \to$

	-۲		۱	
$۱-m$	+	+	۰	−
$۲+m$	−	۰	+	+

$\to (-۲, ۱)$

۱۱۰

$\underbrace{\tan ۳۰^\circ}_{-\tan ۹^\circ} \times \underbrace{\cos ۲۱۰^\circ}_{-\frac{\cos ۳^\circ}{\sin ۹^\circ}} + \underbrace{\tan ۴۸۰^\circ}_{\tan ۱۲^\circ} \times \underbrace{\sin ۸۴۰^\circ}_{\sin ۱۲^\circ} = \underbrace{-\sqrt{۳} \times -\frac{\sqrt{۳}}{۲}}_{\frac{۳}{۲}} + \underbrace{\sqrt{۳} \times \frac{\sqrt{۳}}{۲}}_{\frac{۳}{۲}} = ۳$