

①

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

$$- \tan \frac{\pi}{2} \times \cos \sin \frac{\pi}{2} = - \sin^2 \frac{\pi}{2} = -\frac{1}{1}$$

$$ب) \tan\left(3\pi - \frac{\pi}{4}\right) \sin\left(\pi - \frac{\pi}{4}\right) + \cos\left(3\pi + \frac{\pi}{4}\right)$$

$$\left(-\tan \frac{\pi}{4}\right) \left(-\sin \frac{\pi}{4}\right) + \left(-\cos \frac{\pi}{4}\right) = \left(-\frac{\sqrt{2}}{2} \times -\frac{\sqrt{2}}{2}\right) + \left(-\frac{1}{\sqrt{2}}\right) = 0$$

$$\rightarrow \frac{3 \cot x - 1}{\cot x + 1} = \frac{12 - 1}{1 + 1} = \frac{11}{2}$$

②

$$\sin \alpha = 2 \cos \alpha \Rightarrow \tan \alpha = 2 \quad 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \rightarrow 1 + 4 = \frac{1}{\cos^2 \alpha} \rightarrow \cos \alpha = -\frac{1}{\sqrt{5}}$$

③

$$الف) \sin \alpha = \frac{\sqrt{2}}{10} \Rightarrow \cos\left(3\pi - \alpha\right)$$

$$\sin^2 \alpha \rightarrow \cos^2 \alpha = 1 \rightarrow \left(\frac{\sqrt{2}}{10}\right)^2 + \cos^2 \alpha = 1 \rightarrow \cos \alpha = -\frac{\sqrt{98}}{10}$$

$$\cos\left(3\pi - \alpha\right) = \cos 3\pi \cos \alpha - \sin 3\pi \sin \alpha = \frac{1}{10} - \frac{1}{10} = \frac{4}{10}$$

④

$$ب) \tan \alpha = \frac{1}{\sqrt{2}} \rightarrow \sin\left(\frac{13\pi}{2} + \alpha\right) \quad 1 + \frac{1}{2} = \frac{1}{\cos^2 \alpha} \rightarrow \cos \alpha = \frac{\sqrt{2}}{2} \quad \sin\left(\frac{13\pi}{2} + \alpha\right)$$

$$\sin\left(\frac{13\pi}{2} + \alpha\right) = \sin \frac{13\pi}{2} \cos \alpha + \cos \frac{13\pi}{2} \sin \alpha = -\frac{\sqrt{2}}{2} \cos \alpha - \frac{\sqrt{2}}{2} \sin \alpha = -\frac{\sqrt{2}}{2} (\cos + \sin)$$

$$\cos = \frac{\sqrt{2}}{10} \quad \sin \cdot \tan \times \cos = \frac{\sqrt{2}}{10} \quad -\frac{\sqrt{2}}{2} \left(\frac{\sqrt{2}}{10} + \frac{\sqrt{2}}{10}\right) = -\frac{2}{10}$$

$$\sin^2 x + \cos^2 x + \sin^2 x = \frac{4}{9} \Rightarrow \sin^2 x = \frac{1}{9} \rightarrow 1 + \cot^2 x = \frac{1}{\sin^2 x} \Rightarrow \cot^2 x = 2$$

⑤

$$\tan^2 x = \frac{1}{\cot^2 x} \rightarrow \tan^2 x = \frac{1}{2}$$

$$الف) \sqrt{2}, 4, \alpha \quad 3 = f1\omega$$

⑥

$$f1\omega = \frac{1}{\sqrt{2}} \times ab \times \sin \alpha \rightarrow \frac{1}{\sqrt{2}} \times \sqrt{2} \times 4 \times \sin \alpha = 3 \rightarrow \sin \alpha = \frac{\sqrt{2}}{4} \rightarrow \alpha < 180^\circ \text{ و } \alpha < \pi$$

$$\frac{x}{40} \rightarrow 40 \quad \frac{y}{20} \rightarrow 160 \quad \frac{140}{40} = 2 = \frac{2x}{y} = 2$$

$$\frac{x}{100 - 30}$$

$$ab \sin \alpha = \omega f \rightarrow ab (\sin \omega f) = \omega f \rightarrow ab \left(\frac{1}{f} \right) = \omega f \Rightarrow ab = 10 \text{ m} \quad (v)$$

$$a = \frac{v}{f} b \Rightarrow \left(\frac{v}{f} b \right) \cdot (b) = 10 \text{ m} \rightarrow \frac{v}{f} b^2 = 10 \text{ m} \rightarrow b^2 = 14 \text{ m}, b = 9\sqrt{2}, a = 9\sqrt{2}$$

$$L_{\text{area}} = 2(9\sqrt{2} + 9\sqrt{2}) = 36\sqrt{2}$$

(1)

$$S(ABC) - S(ADE) = 1/10 \text{ m}$$

$$S = \frac{1}{2} ab \sin \theta \quad \frac{1}{2} (AB)(AC) \sin A = \frac{1}{2} \times 10 \times v \times \sin A = 1/10 \sin A$$

$$\frac{1}{2} (AD)(AE) \sin A = \frac{1}{2} \times v \times f \times \sin A = 1/10 \sin A \quad 1/10 \sin A = 1/10 \sin A \cdot 3/10 \sin A = 1/10 \sin A$$

$$1 + \cot^2 A = \frac{1}{\sin^2 A} \Rightarrow \cot^2 A = 3 \rightarrow \tan A = \frac{1}{\sqrt{3}} \quad \sin A = \frac{1}{2}$$

$$BN = 3 NC \rightarrow \frac{BN}{NC} = \frac{3}{1} \quad (9)$$

$$BC = BN + NC = 3/4 + 1/4 = 1 \text{ m} \rightarrow \frac{BM}{BC} = \frac{3/4}{1} = \frac{3}{4}$$

$$\frac{S_{BMN}}{S_{ABC}} = \frac{BM \times BN}{BA \times BC} = \frac{1}{3} \rightarrow \frac{1}{3} = \frac{BM}{BA} \times \frac{3}{4} \rightarrow \frac{BM}{BA} = \frac{4}{9}$$

$$\frac{BM}{BM + AM} = \frac{4}{9} \rightarrow \frac{BM}{AM} = \frac{4}{9-4} = \frac{4}{5}$$

$$\star \frac{1}{\sqrt{\cos^2 \alpha}} = \tan \alpha = \frac{1 + \sin \alpha}{|\cos \alpha|} \Rightarrow \cos \alpha \neq 0 \text{ پس } \cot \alpha \neq 0, \sin \alpha < 0 \quad (6)$$

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

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$$\star \frac{-\sin \alpha}{\cos \alpha} = -\frac{\sin \alpha}{\cos \alpha} \rightarrow \sin \alpha < 0, \cos \alpha \neq 0$$

$$\star \frac{1 - (1 + \sin \alpha)}{(\cos \alpha)} = \tan \alpha \rightarrow \frac{1 - 1 - \sin \alpha}{|\cos \alpha|} = \frac{\sin \alpha}{\cos \alpha} \rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{\cos \alpha} \Rightarrow \cos \alpha < 0$$