امین جلالی

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۱)

$$\frac{a\sin(\pi+\frac{\pi}{3})+b\cos(\pi+\frac{\pi}{6})}{a\sin(2\pi-\frac{\pi}{6})+b\cos\frac{\pi}{3}} = \frac{-a\sin\frac{\pi}{3}+(-b\cos\frac{\pi}{6})}{-a\sin\frac{\pi}{6}+b\cos\frac{\pi}{3}} = -\tan\frac{\pi}{4}$$

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$$\frac{-\frac{\sqrt{3}}{2}a-\frac{\sqrt{3}}{2}b}{-\frac{1}{2}a+\frac{1}{2}b} = -\frac{\sqrt{3}}{3} \longrightarrow \frac{\frac{-3a-3b}{2}}{\frac{-a+b}{2}} = -1 \Rightarrow \frac{-3a-3b}{-a+b} = -1 \Rightarrow -3a-3b = a-b \Rightarrow -4a = 2b \Rightarrow \boxed{\frac{b}{a}=-2}$$

۲)

$P\left|\begin{matrix}\frac{1}{2}\\ y\to\frac{\sqrt{3}}{2}\end{matrix}\right.$ $\Longrightarrow$ $\overline{OP}=1$, $\overline{OP'}=1$

$P'\left|\begin{matrix}0\\1\end{matrix}\right.$

$$PP' = \sqrt{\left(\frac{1}{4}\right)+\left(\frac{(2-\sqrt{3})}{2}\right)^2} = \sqrt{\frac{8-4\sqrt{3}}{4}} = \sqrt{2-\sqrt{3}}$$

$$\frac{4+3-4\sqrt{3}}{4}$$

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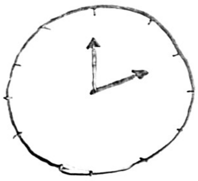
$$\Longrightarrow \boxed{P = 2+\sqrt{2-\sqrt{3}}}$$

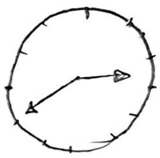
۳)



$\frac{\pi}{6}=30^\circ$ $\longrightarrow$

30°	60min
20°	40min

$\longrightarrow$



$\longrightarrow$ $\boxed{2:40}$

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۴)

$$\alpha = \left|\frac{11M}{2}-30H\right| \Longrightarrow 20 = \left|\frac{11M}{2}-90\right| \Rightarrow \frac{11M}{2}-90=20 \Rightarrow \frac{11M}{2}=110 \Rightarrow M=20min$$

بار دوم

$$\hookrightarrow \frac{11M}{2}-90=-20 \Rightarrow \frac{11M}{2}=70 \Rightarrow M=\frac{140}{11}min$$

بار اول

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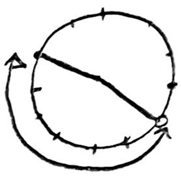
۵)



$\longrightarrow$ max sin = $\frac{1}{2}$ ~~(1)~~ ①, min sin = $-\frac{1}{2}$

$$\Longrightarrow -1 \leqslant \frac{m-3}{5} \leqslant \frac{1}{2} \Rightarrow -5 \leqslant m-3 \leqslant 2/5$$

$$\Rightarrow \boxed{-2 \leqslant m \leqslant 5/5}$$

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$$-\frac{1}{2} < \frac{m-3}{5} \leqslant 1 \rightarrow -2/5 \leqslant m-3 \leqslant 5$$

$$-0/5 \leqslant m \leqslant 8$$

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$$\frac{-\sin(90+10)+k\cos(270-10)}{\cos(180-10)+2\sin(180+10)} \Rightarrow \frac{+\cos 10 - k\sin 10}{-\cos 10 - 2\sin 10} = 3$$

$$\tan 10 = \frac{1}{5} \Rightarrow \frac{\sin 10}{\cos 10} = \frac{1}{5} \Rightarrow \begin{matrix}\sin 10 = a \\ \cos 10 = 5a\end{matrix} \Rightarrow \frac{+5a - ka}{-5a - 2a} = 3 \Rightarrow \frac{5+k}{7} = 3$$

$$\Rightarrow \boxed{k = 16}$$

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$$-18a = +5a - ka$$

$$-23a = -ka \rightarrow k = 23$$

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$$\frac{+\cot x + \cot x}{\tan x - 2\tan x} = \frac{2\cot x}{-\tan x} = -2\left(\frac{\frac{\cos x}{\sin x}}{\frac{\sin x}{\cos x}}\right) = -2\left(\frac{\cos^2 x}{\sin^2 x}\right)$$

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$$1 - \cos x = 2 + 2\cos x \Rightarrow 3\cos x = -1 \Rightarrow \cos x = -\frac{1}{3} \Rightarrow \sin^2 + \cos^2 = 1 \Rightarrow \sin^2 x = \frac{8}{9}$$

$$\rightarrow -2\left(\frac{\frac{1}{9}}{\frac{8}{9}}\right) = -2\left(\frac{1}{8}\right) = \boxed{-\frac{1}{4}}$$ 2

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$$\frac{108}{180} = \frac{Rad}{\pi} \Rightarrow \frac{108\pi}{180} = \frac{6\pi}{10} \Rightarrow \boxed{\frac{3\pi}{5}}$$

$$\Rightarrow \alpha r \Rightarrow \frac{3\pi}{5} \times 2A = \frac{6\pi}{10} \times 2B \Rightarrow \frac{2A}{2B} = \frac{6\pi}{10} \times \frac{3}{3\pi} = \frac{3}{2}$$

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$$\Rightarrow \frac{SA}{SB} = \frac{\pi (2A)^2}{\pi (2B)^2} = \left(\frac{2A}{2B}\right)^2 = \boxed{\frac{9}{4}}$$ 2

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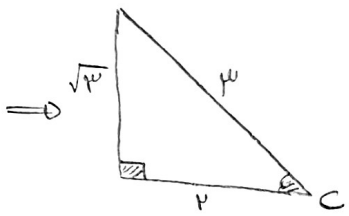
$$\hat{D} = 90 \Rightarrow \frac{BD}{AD} = \frac{1}{2} \Rightarrow AD = 2, \quad \underline{AB = \sqrt{3}}$$

$$\Rightarrow S_{A\hat{B}C} = \frac{1}{2} \times \underbrace{AB}_{\sqrt{3}} \times BC = \sqrt{3} \Rightarrow \boxed{BC = 2}$$



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$$\sin 2C = 2\sin C\cos C \Rightarrow 2\left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{2}\right) = \boxed{\frac{\sqrt{3}}{2}}$$

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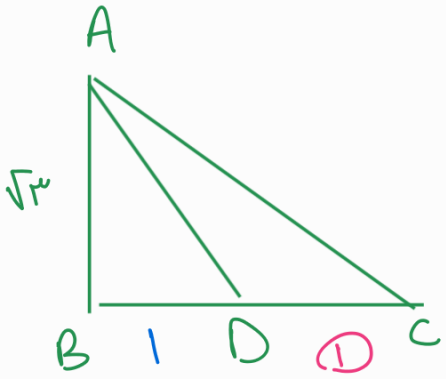
$$\theta + \alpha + \alpha = 90 \Rightarrow \theta + 2\alpha = 90$$

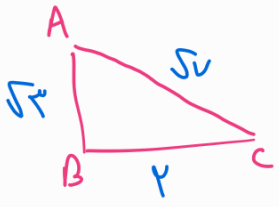
$$\Rightarrow \sin 2\alpha = \cos\theta \Rightarrow \cos\theta = \frac{4}{\sqrt{13}} \Rightarrow \sin\theta = \frac{3}{\sqrt{13}}$$

$$\Rightarrow \sin 2\alpha = 2\sin\alpha\cos\alpha = 2\left(\frac{2}{\sqrt{13}}\right)\left(\frac{3}{\sqrt{13}}\right) = \frac{12}{13}$$



$S_{ABC} = \sqrt{٣}$

$$\frac{AB \times BC}{٢} = \frac{\sqrt{٣} \cdot BC}{٢} = \sqrt{٣} \rightarrow BC = ٢ \rightarrow DC = ١$$



$$\rightarrow \sin \hat{C} = ٢ \times \frac{\sqrt{٣}}{\sqrt{٧}} \times \frac{٢}{\sqrt{٧}} = \frac{٤\sqrt{٣}}{٧}$$