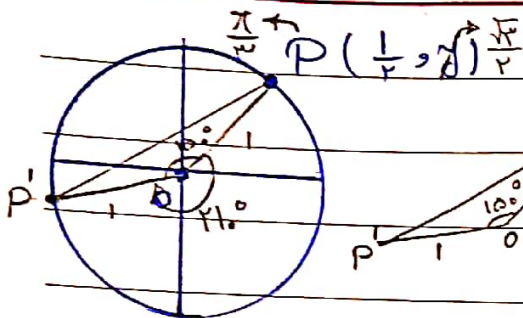


«مسائل امتحان آشنایی»

1.
$$\frac{a \sin \frac{\pi}{4} + b \cos \frac{\pi}{4}}{a \sin \frac{11\pi}{4} + b \cos \frac{\pi}{4}} = \frac{\tan \alpha}{\frac{1}{\sqrt{3}}}$$

$$\frac{1/\sqrt{3}(a+b)}{1/\sqrt{3}(b-a)} = \frac{1}{\sqrt{3}} \Rightarrow \frac{(a+b)}{(b-a)} = \frac{1}{\sqrt{3}} \Rightarrow \sqrt{3}a + \sqrt{3}b = b - a$$

$$\sqrt{3}a = -\sqrt{3}b \Rightarrow \frac{b}{a} = \frac{\sqrt{3}}{-\sqrt{3}} = -1$$



2. زاویه بین دو خط مماس 120°

بین دو خط مماس که از یک نقطه خارج می‌آید:

$$(PP')^2 = 1 + 1 - 2(1)(1)\cos(120^\circ)$$

$$(PP')^2 = 2 - 2(-\frac{1}{2}) = 2 + 1 = 3$$

$$PP' = \sqrt{3}$$

$$P'PO \text{ مساحت: } 1 + 1 + \sqrt{2 + \sqrt{3}} = 2 + \sqrt{2 + \sqrt{3}}$$

3.
$$\frac{\pi}{4} = \frac{D}{180} \Rightarrow \frac{1}{4} = \frac{D}{180} \Rightarrow D = 45^\circ$$

ساعت 4:00 min $\Rightarrow \lambda = 40 \text{ min} \Rightarrow \lambda = 40' \text{ خواهد بود}$

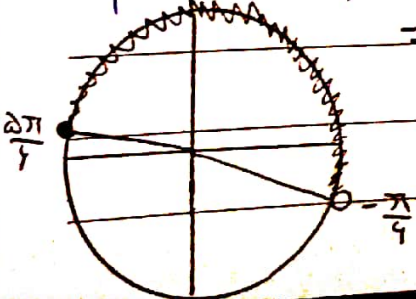
4.
$$\lambda = |\omega/\omega_M - 90| \Rightarrow 20 = |\omega/\omega_M - 90|$$

$$\omega/\omega_M - 90 = 20 \rightarrow \omega/\omega_M = 110 \Rightarrow M = 2.11 \text{ min}$$

$$\omega/\omega_M - 90 = -20 \rightarrow \omega/\omega_M = 70 \Rightarrow M = 1.71 \text{ min}$$

5.
$$\frac{-\pi}{4} < \alpha < \frac{\pi}{4} \rightarrow \sin \alpha = \frac{M-1}{\omega}$$

$$\frac{-1}{\sqrt{2}} < \sin \alpha < \frac{1}{\sqrt{2}} \rightarrow \frac{-1}{\sqrt{2}} < \frac{M-1}{\omega} < \frac{1}{\sqrt{2}}$$



$$\cos 10^\circ$$

$$-\sin 10^\circ$$

$$\sin(10^\circ + 10^\circ)$$

$$\cos(10^\circ - 10^\circ)$$

$$\sin(10^\circ) + k \cos(10^\circ)$$

$$= \mu$$

$$\tan 10^\circ = 0.176$$

$$\cos(10^\circ) + r \sin(10^\circ)$$

$$k = ?$$

$$\cos(10^\circ - 10^\circ)$$

$$\sin(10^\circ + 10^\circ)$$

$$-\cos 10^\circ$$

$$-\sin 10^\circ$$

$$\Rightarrow \frac{\cos 10^\circ - k \sin 10^\circ}{-\cos 10^\circ - r \sin 10^\circ} = \mu \div \cos 10^\circ$$

$$\frac{1 - k \tan 10^\circ}{-1 - r \tan 10^\circ} = \mu \Rightarrow \frac{+1 - 0.176k}{-1 - r(-0.176)} = \mu$$

$$+1 - 0.176k = -r/\mu$$

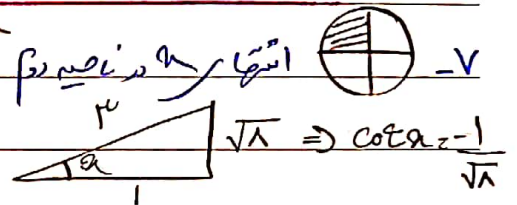
$$0.176 = 0.176k \Rightarrow k = 1.1$$

$$\frac{1 - \cos 2\alpha}{1 + \cos 2\alpha} = r$$

$$1 - \cos 2\alpha = r + r \cos 2\alpha$$

$$-1 = r \cos 2\alpha$$

$$\cos 2\alpha = \frac{-1}{r}$$



$$+ \cot 2\alpha$$

$$- \cot 2\alpha$$

$$\tan\left(\frac{\pi}{r} - \alpha\right) - \cot(\pi - \alpha)$$

$$\cot\left(\frac{\pi}{r} - \alpha\right) + r \tan(\pi - \alpha)$$

$$+ \tan \alpha$$

$$- \tan \alpha$$

$$\frac{\cot \alpha + \cot \alpha}{\tan \alpha - r \tan \alpha} \Rightarrow$$

$$\frac{r \cot \alpha}{- \tan \alpha}$$

$$\frac{r \cos \alpha}{\sin \alpha} \div \frac{- \sin \alpha}{\cos \alpha}$$

$$= \frac{-r \cos \alpha}{\sin \alpha}$$

$$= -r \cot \alpha = -r \left(\frac{-1}{\sqrt{1+r^2}}\right) = \frac{r}{\sqrt{1+r^2}}$$

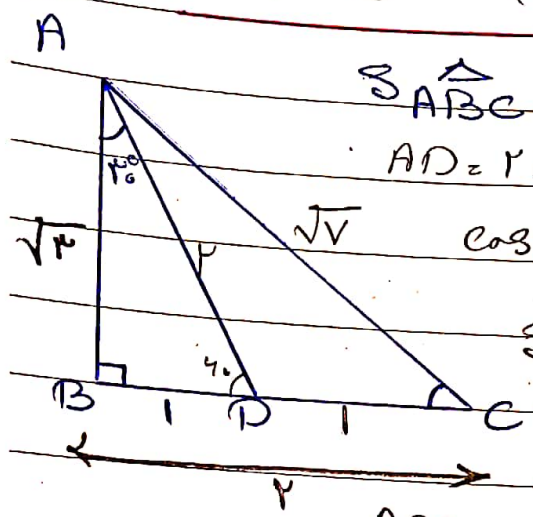
طول وتر دایره به نصف وتر دایره دیگر = 3/4
 طول وتر دایره به نصف وتر دایره دیگر = 3/4

$$\frac{10.8}{180} = \frac{R \sin 45^\circ}{\pi} \Rightarrow R \sin 45^\circ = \frac{4\pi}{10}$$

$$l_A = l_B \quad (d = d_R)$$

$$(S = \pi r^2) \quad \frac{4\pi}{10} \times r_A = \frac{4\pi}{10} \times r_B \Rightarrow \frac{r_A}{r_B} = \frac{4}{5} = \frac{r}{r}$$

$$\frac{S_A}{S_B} = \frac{\pi r_A^2}{\pi r_B^2} = \left(\frac{r_A}{r_B}\right)^2 = \left(\frac{4}{5}\right)^2 = \frac{16}{25}$$



$$S_{ABC} = \sqrt{13} \Rightarrow \sin \hat{C} = ?$$

$$AD = BD = DC = 1$$

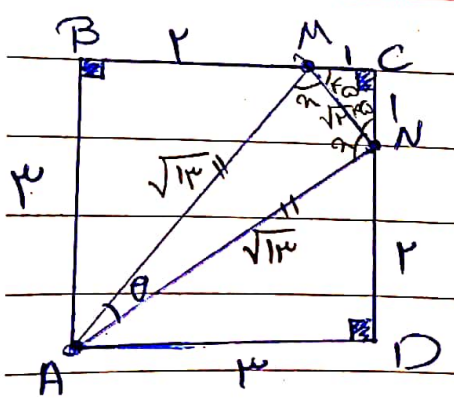
$$\cos 30^\circ = \frac{\sqrt{13}}{2} = \frac{AB}{2} \Rightarrow AB = \sqrt{13}$$

$$S_{ABC} = \frac{AB \times BC}{2} = \sqrt{13} \Rightarrow$$

$$\frac{\sqrt{13} \times BC}{2} = \sqrt{13} \Rightarrow BC = 2 \Rightarrow DC = 1$$

$$ABC \text{ مثلث قائمه } \Rightarrow AC = \sqrt{5}$$

$$\sin \hat{C} = \frac{AB}{AC} = \frac{\sqrt{13}}{\sqrt{5}} \Rightarrow \sin \hat{C} = \frac{\sqrt{65}}{5}$$



$$\sin \theta = ?$$

$$AM^2 = 4^2 + 1^2 \Rightarrow AM = \sqrt{17}$$

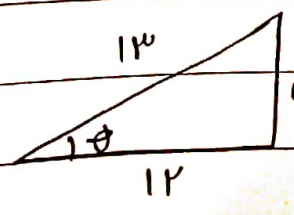
$$AN^2 = 3^2 + 1^2 \Rightarrow AN = \sqrt{10}$$

$$MC = NC = 1 \Rightarrow \triangle MCN \text{ مثلث قائم } \Rightarrow \hat{M} = \hat{N} = 45^\circ$$

$$MN = \sqrt{2}$$

$$2^2 = 1^2 + 1^2 - 2(1)(1)(\cos \theta)$$

$$2 = 2 - 2 \cos \theta \Rightarrow 2 \cos \theta = 0$$



$$\Rightarrow \sin \theta = \frac{1}{2}$$

$$\cos \theta = \frac{1}{2} \Rightarrow \cos \theta = \frac{1}{2}$$