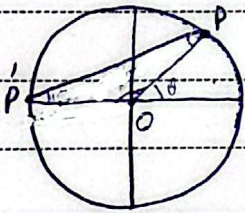


میدان ریاضی

$$\frac{a \sin \frac{\pi}{4} + b \cos \frac{\pi}{4}}{a \sin \frac{3\pi}{4} + b \cos \frac{\pi}{4}} = \tan \alpha \quad \xrightarrow{\text{ضرب کنیم}} \frac{ax - \frac{\sqrt{2}}{2} + bx - \frac{\sqrt{2}}{2}}{ax - \frac{1}{2} + bx - \frac{1}{2}} = \frac{-\sqrt{2}}{1} \quad (1)$$

$$\frac{-\frac{\sqrt{2}}{2}(a+b)}{\frac{1}{2}(b-a)} = \frac{-\sqrt{2}}{1} \rightarrow \frac{a+b}{b-a} = \frac{1}{\sqrt{2}} \rightarrow \sqrt{2}a + \sqrt{2}b = b - a \rightarrow \sqrt{2}a = -\sqrt{2}b \rightarrow \frac{a}{b} = -1$$



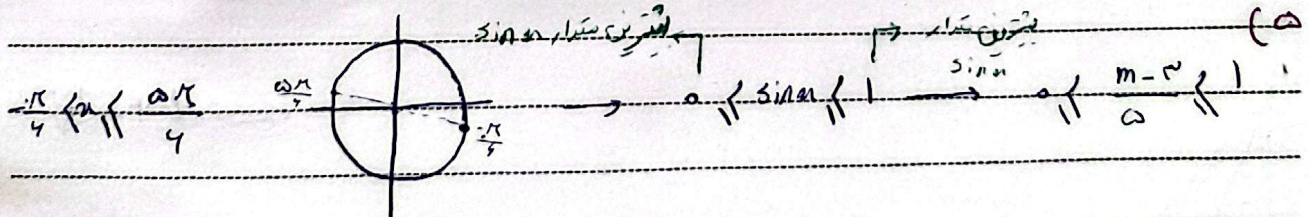
(2) چون $\frac{1}{\sqrt{2}} = \sin \theta$ است پس $\theta = 30^\circ$
 $\alpha_0 + 180^\circ = 180^\circ$ (برای $\alpha_0 = 180^\circ$ به خط عمود می‌زنیم)
 $\angle P O P' = 180^\circ$

$$|PP'| = OP + OP' = 1 + 1 = 2 \quad \text{و} \quad OP \cdot OP' \cos 180^\circ = 1 + 1 - \sqrt{2} = 2 - \sqrt{2} \rightarrow \sqrt{2} = 2 - \sqrt{2} \rightarrow \sqrt{2} = \frac{2}{2} = 1$$

$$\frac{\pi}{9} = \frac{180}{9} = 20^\circ \rightarrow \text{مقدار بسیار کم است و تقریباً صفر است} \rightarrow \text{دیده} \rightarrow \alpha : \alpha' \quad (3)$$

$$\alpha = \left| \frac{1}{\sqrt{2}} M - \alpha_0 H \right| = 20^\circ \quad \left| \frac{1}{\sqrt{2}} M - 90^\circ \right| = 20^\circ \rightarrow \begin{cases} \frac{1}{\sqrt{2}} M - 90^\circ = -20^\circ \rightarrow M = 12.4^\circ \\ \frac{1}{\sqrt{2}} M - 90^\circ = 20^\circ \rightarrow M = 70^\circ \end{cases}$$

بالا 12.4 درجه و پایین 70 درجه



$$\alpha \approx m - 3^\circ \rightarrow 3^\circ \approx m \rightarrow \text{مقدار کم}$$

$$\tan 1\alpha = \frac{\sin 1\alpha}{\cos 1\alpha} = \frac{1}{r} \rightarrow \sin 1\alpha = 1 \quad \cos 1\alpha = r$$

$$\sin(90^\circ + 1\alpha) + K \cos(180^\circ - 1\alpha) \quad \cos 1\alpha = K \sin 1\alpha$$

$$\cos(180^\circ - 1\alpha) + r \sin(180^\circ + 1\alpha) \quad -\cos 1\alpha - r \sin 1\alpha$$

$$\frac{r - K}{-r} = r \rightarrow r - K = -1r \rightarrow K = 2r$$

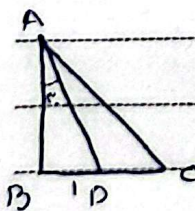
$$1 - \cos \alpha = r + r \cos \alpha \rightarrow \cos \alpha = \frac{-1}{r} \quad \sin \alpha = \sqrt{1 - \frac{1}{r^2}} = \frac{\sqrt{r^2 - 1}}{r}$$

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

$$\frac{\text{Rad}}{r} = \frac{D}{1\alpha^\circ} \rightarrow \frac{\pi}{r} = \frac{10\pi}{1\alpha^\circ} \rightarrow \alpha = \frac{4\pi}{10}$$

$$\text{طول یکنواخت} \rightarrow \alpha_1 R_1 = \alpha_2 R_2 \rightarrow \frac{4\pi}{10} R_1 = \frac{9\pi}{10} R_2 \rightarrow \frac{R_1}{R_2} = \frac{9}{4}$$

$$\text{نسبت مساحت ها} \rightarrow \frac{\pi R_A^2}{\pi R_B^2} = \left(\frac{9}{4}\right)^2 = \frac{9}{4}$$

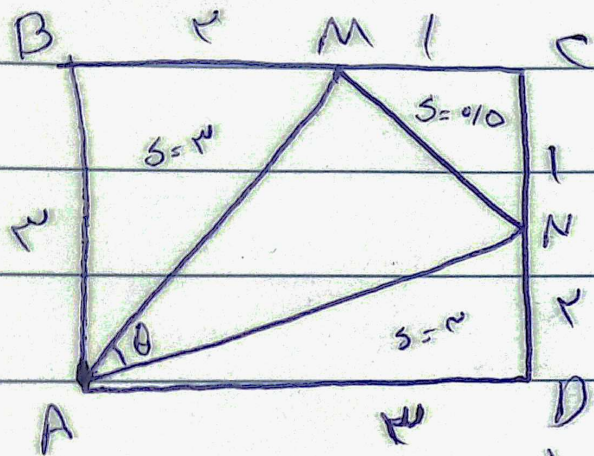


$$A_1 = \frac{1}{2} \times BC \times AD \rightarrow AB = \sqrt{r^2 - 1}$$

$$S = \sqrt{r^2 - 1} \rightarrow AB \times BC = \sqrt{r^2 - 1} \rightarrow BC = r$$

$$\cos C = \frac{AB}{BC} = \frac{\sqrt{r^2 - 1}}{r} \rightarrow \cos^2 C = \frac{1}{1 + \tan^2 C} = \frac{1}{1 + \frac{r^2}{r^2 - 1}} = \frac{r^2 - 1}{r^2}$$

$$\cos C = \frac{r}{\sqrt{r^2 - 1}}, \sin C = \frac{\sqrt{r^2 - 1}}{r} \rightarrow \sin^2 C = r^2 \sin^2 C \cos^2 C = \frac{r^2}{r^2} \times \frac{r^2 - 1}{r^2} = \frac{r^2 - 1}{r^2}$$



(10)

برس $S = 9$ $\sin S = 9 \rightarrow 9/10 = 2/10$

$AN = AM = \sqrt{9 + 1} = \sqrt{10}$

برس $S = \frac{\sqrt{10} \times \sqrt{10} \times \sin \theta}{2} = 9/10 \rightarrow \sin \theta = \frac{9}{10}$