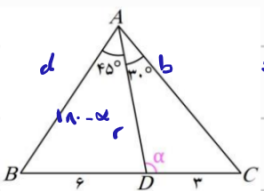


$$\sin \alpha = \frac{BC}{OB} \quad BC=1 \rightarrow \sin \alpha = \frac{1}{OB} \rightarrow OB = \frac{1}{\sin \alpha}$$

$$AB = OB - OA \rightarrow AB = \frac{1}{\sin \alpha} - 1 = \frac{1 - \sin \alpha}{\sin \alpha}$$

سوال ۱) واضح است که طول پاره خط OA، ۱ است

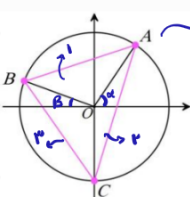


$$\frac{d}{\sin(\alpha - \alpha)} = \frac{c}{\sin \alpha} \rightarrow \frac{d}{\sin \alpha} = \frac{c}{\frac{\sqrt{2}}{2}} \rightarrow d = \frac{12 \times \sin \alpha}{\sqrt{2}}$$

$$\frac{b}{\sin \alpha} = \frac{3}{\sin \alpha} \rightarrow \frac{b}{\sin \alpha} = \frac{3}{\frac{1}{2}} \Rightarrow b = 4 \sin \alpha$$

$$\left. \begin{aligned} \frac{AB}{AC} &= \frac{d}{b} = \frac{\frac{12 \times \sin \alpha}{\sqrt{2}}}{4 \sin \alpha} = \frac{3}{\sqrt{2}} = \sqrt{2} \end{aligned} \right\}$$

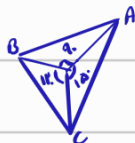
سوال ۲)



$$A \text{ عرض نقطه } = \cos \alpha = \frac{1}{2} \rightarrow \alpha = 60^\circ$$

$$B \text{ عرض نقطه } = \sin \beta = \frac{1}{2} \rightarrow \beta = 30^\circ$$

$$S_{\triangle} = S_1 + S_2 + S_3$$



$$S_1 = \frac{1}{2} \times 1 \times 1 \times \sin 90^\circ = \frac{1}{2}$$

$$S_2 = \frac{1}{2} \times 1 \times 1 \times \sin 120^\circ = \frac{1}{2}$$

$$S_3 = \frac{1}{2} \times 1 \times 1 \times \sin 120^\circ = \frac{\sqrt{3}}{4}$$

$$\left. \begin{aligned} S_{\triangle} &= \frac{1}{2} + \frac{1}{2} + \frac{\sqrt{3}}{4} = \frac{3 + \sqrt{3}}{4} \end{aligned} \right\}$$

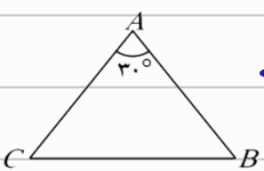
سوال ۳)

$$a^2 = b^2 + c^2 - 2bc \cos \hat{A} \rightarrow a^2 = 1 + 1 - 2 \cos 120^\circ \rightarrow a = \sqrt{3}$$

$$b^2 = 1 + 1 - 2 \cos 150^\circ \rightarrow b = \sqrt{2 + \sqrt{3}}$$

$$c^2 = 1 + 1 - 2 \cos 90^\circ \rightarrow c = \sqrt{2}$$

$$\left. \begin{aligned} a &= \sqrt{3} \\ b &= \sqrt{2 + \sqrt{3}} \\ c &= \sqrt{2} \end{aligned} \right\} \text{محيط مثلث} = \sqrt{3} + \sqrt{2} + \sqrt{2 + \sqrt{3}}$$



$$S_{\triangle} = \frac{1}{2} \times AC \times AB \times \sin \hat{A} \rightarrow S_{\triangle} = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \sin 120^\circ = \frac{1}{4}$$

$$\rightarrow \frac{1}{2} \times 3 \times 2 \times \frac{1}{2} = 3$$

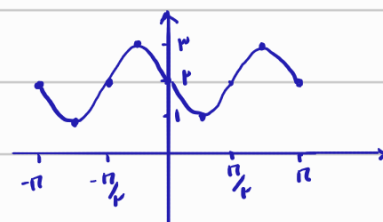
سوال ۴)

سوال ۵) در عبارت داده شده بجای n ها، $\cos \alpha$ میذاریم و عبارت را برابر با دایمی مانده است بررسی دهیم

$$2n^4 - n^2 - \sin^2(\alpha)(2 \sin^2 \alpha - 1) \rightarrow 2 \cos^4 \alpha - \cos^2 \alpha - 2 \sin^4 \alpha + \sin^2 \alpha = 1 \rightarrow \sin^2 \alpha - \cos^2 \alpha + 2(\cos^2 \alpha - \sin^2 \alpha) = 1$$

$$\rightarrow -\cos^2 \alpha + 2 \cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = 1 \Rightarrow \sin^2 \alpha = 0$$

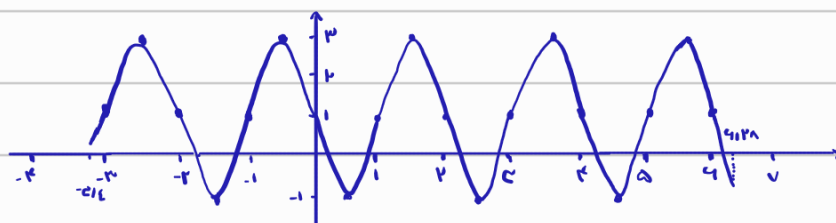
$$(a) -2 \sin \pi \cos \pi + 2 = -\sin 2\pi + 2 = \frac{2\pi}{1} = \frac{2\pi}{2} = \pi$$



سوال ۶)

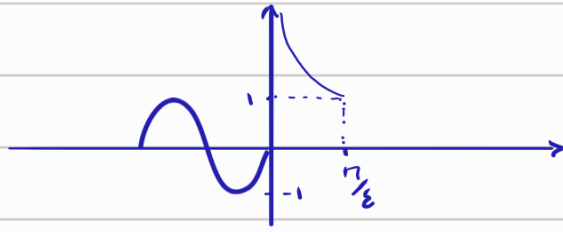
$$(b) 2 \cos\left(n + \frac{1}{2}\right) \pi + 1 = 2 \cos\left(\pi n + \frac{\pi}{2}\right) + 1 \quad [-\pi, \pi] \rightarrow 4\pi n$$

$$\rightarrow -2 \sin(\pi n) + 1 \rightarrow \text{درست است: } \frac{2\pi}{\pi} = 2$$



سوال ۷)

$$f(x) = \begin{cases} \cos x & ; 0 < x < \frac{\pi}{2} \\ \sin x & ; x < 0 \end{cases}$$



سوال ۸)

$$a + b + \sin(x) \cos(x) \cos(x) = a + b + \frac{1}{4} \sin(4x) \cos(4x) = a + b + \frac{1}{8} \sin(8x)$$

$$\frac{y_{\max} + y_{\min}}{2} = a \rightarrow \frac{4+0}{2} = 2 = a, \quad \frac{y_{\max} - y_{\min}}{2} = |b| \rightarrow \frac{4-0}{2} = 2 = |b| \rightarrow b = 2$$

$$\frac{y_{\max} + y_{\min}}{2} = a \rightarrow \frac{4+0}{2} = 2 = a, \quad \frac{y_{\max} - y_{\min}}{2} = |b| \rightarrow \frac{4-0}{2} = 2 = |b| \rightarrow b = 2$$

$$\frac{y_{\max} - y_{\min}}{2} = |b| \rightarrow \frac{4-0}{2} = 2 = |b| \rightarrow b = 2$$

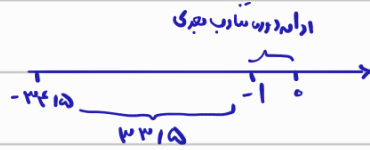
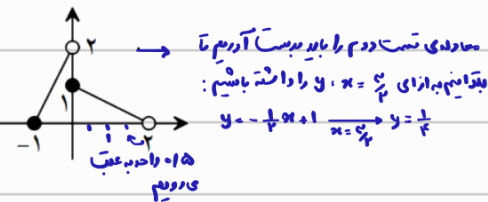
سوال ۹)

$$b = 2 \rightarrow \text{چون تابع } \cos \text{ با محور شروع شده است پس } a = -3, \quad \frac{y_{\max} + y_{\min}}{2} = a \rightarrow \frac{4-6}{2} = -1 = a$$

$$\frac{y_{\max} + y_{\min}}{2} = a \rightarrow \frac{4-6}{2} = -1 = a, \quad \frac{y_{\max} - y_{\min}}{2} = |a| \rightarrow \frac{4-6}{2} = -1 = |a| \rightarrow a = -1$$

$$\rightarrow f(x) = -3 \cos 2x - 1, \quad x = \alpha \rightarrow -3 \cos 2\alpha - 1 = 0 \rightarrow \cos 2\alpha = -\frac{1}{3} \rightarrow 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \rightarrow 1 + \tan^2 \alpha = \frac{1}{\frac{1}{9}} \rightarrow |\tan \alpha| = 2\sqrt{2}$$

سوال ۱۰)



$$\frac{3}{11} \rightarrow \text{یعنی ۱۱ دور این تکرار شده که این اثر} \rightarrow \frac{3}{11} \rightarrow \text{است در اینجا ۱۱ واحد به عقب رفته است}$$