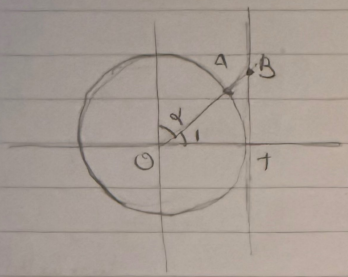
Date No

آیدا هیرودیا



۱.

A | $\cos(\frac{\pi}{2}-\alpha) \to \sin\alpha$

$\sin(\frac{\pi}{2}-\alpha) \to \cos\alpha$

B | 1

$\tan(\frac{\pi}{2}-\alpha) \to \cot\alpha$

$\bar{A}B = \sqrt{(\sin\alpha-1)^2+(\cos\alpha-\cot\alpha)^2}$ $\quad AB = \frac{\sin\alpha-1}{\sin\alpha}$

$\sin^2\alpha+1-2\sin\alpha$ $\quad \cos\alpha-\cot\alpha = \cos\alpha-\frac{\cos\alpha}{\sin\alpha} = \frac{\cos\alpha(\sin\alpha-1)}{\sin\alpha}$

۲ در $\frac{\cos^2\alpha(\sin^2\alpha+1-2\sin\alpha)}{\sin^2\alpha}$

$= \frac{\sin^2\alpha(\sin^2\alpha+1-2\sin\alpha)+(1-\sin^2\alpha)(\sin^2\alpha+1-2\sin\alpha)}{\sin^2\alpha} = \frac{1+\sin^2\alpha-2\sin\alpha}{\sin^2\alpha}$

$AB = \sqrt{\frac{(\sin\alpha-1)^2}{\sin^2\alpha}} \quad AB = \frac{\sin\alpha-1}{\sin\alpha}$

Scanned with CamScanner

آیلا و مرونیا

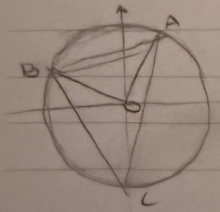
۲.

$$\frac{\sqrt{2}/2}{4} = \frac{\sin(45-\alpha)}{AB} \to \frac{\sqrt{2}}{12} \cdot \frac{\sin\alpha}{AB} \to AB = 12\sin\alpha$$

$$\frac{1}{2}/2 \cdot \frac{\sin\alpha}{AC} \to \frac{1}{4} \cdot \frac{\sin\alpha}{AC} \to AC = 4\sin\alpha$$

$$\to \frac{AB}{AC} = \frac{12\sin\alpha}{4\sin\alpha} = \frac{2}{\sqrt{2}} = \sqrt{2}$$

۳. ب



$$A\left|\frac{1}{2}\ \frac{\sqrt{3}}{2}\right. \quad B\left|\frac{\sqrt{3}}{2}\ -\frac{1}{2}\right. \quad C\left|\begin{matrix}0\\-1\end{matrix}\right.$$

$$\overline{AB} = \sqrt{\left(\frac{1+\sqrt{3}}{2}\right)^2 + \left(\frac{\sqrt{3}-1}{2}\right)^2} = \sqrt{2}$$

$$\overline{BC} = \sqrt{\left(\frac{\sqrt{3}}{2}\right)^2 + \left(-\frac{1}{2}\right)^2} = \sqrt{3}$$

$$\overline{AC} = \sqrt{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}+2}{2}\right)^2} = \sqrt{2+\sqrt{3}}$$

$$\sqrt{2+\sqrt{3}} + \sqrt{2+\sqrt{2}}$$

Scanned with CamScanner

Date No

۳. الف)

$$\cos B = \frac{a^2+c^2-b^2}{2ac}$$

$$\cos B = \frac{2+3-2\sqrt{3}}{2\times\sqrt{2}\times\sqrt{2}} \rightarrow \frac{3-\sqrt{3}}{4} \rightarrow \frac{\sqrt{3}(\sqrt{3}-1)}{\sqrt{3}\times 2\sqrt{2}} \rightarrow \cos B = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

$$\sin B = \frac{\sqrt{3}+1}{2\sqrt{2}}$$

$$S = \frac{1}{2}\times\sqrt{2}\times\sqrt{2}\times\frac{\sqrt{3}+1}{2\sqrt{2}} = \frac{\sqrt{3}+1}{4}$$

ب.

$$a^2 = b^2+c^2-2bc\cos(\hat{A}) \rightarrow c^2-\sqrt{3}bc+b^2-a^2=0$$

$$c = \frac{\sqrt{3}b \pm \sqrt{4a^2-b^2}}{2} \qquad S = \frac{1}{2}\times\sin A\times bc = \frac{b^2\sqrt{3} \pm b\sqrt{4a^2-b^2}}{8}$$

$$\rightarrow S = 2\sqrt{3}(\log_{10}^2)^2 + \sqrt{9-4(\log_{10}^2)^4}$$

ج.

$$x = \cos\alpha \qquad 2\cos^4\alpha - \cos^2\alpha - \sin^2\alpha(2\sin^2\alpha - 1) = 1$$

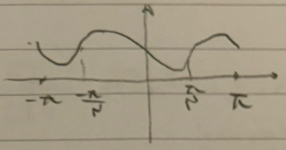
$$\cos^2\alpha(\underbrace{2\cos^2\alpha - 1}_{\cos 2\alpha}) - \sin^2\alpha(\underbrace{2\sin^2\alpha - 1}_{-\cos 2\alpha}) = 1 \rightarrow \cos 2\alpha(\underbrace{\cos^2\alpha + \sin^2\alpha}_{1}) = 1$$

$$\cos 2\alpha = 1 \rightarrow \sin 2\alpha = 0$$

Scanned with CamScanner

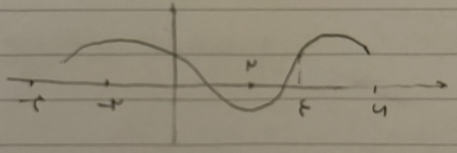
آیلا میردنیا

۶. الف) $T = \frac{2\pi}{|b|} = \frac{2\pi}{2} = \pi$ $y = -2\sin x\cos x + 2 \to y = -\sin 2x + 2$



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

$T = \frac{2\pi}{|b|} = \frac{2\pi}{\pi} = 2$

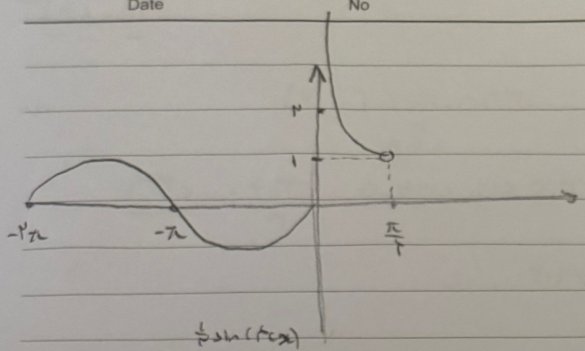


Scanned with CamScanner

Date No

آیلا فروغیان

۷. $R = [-1, +\infty)$



۸. $f(x) = b\sin(cx)\cos(cx)\cos(2cx) + a$

$\frac{1}{2}\sin(2cx)$

$\frac{1}{2}\sin(4cx)$

$f(x) = \frac{b}{2}\sin(4cx) + a$

$\begin{cases} \frac{b}{2} + a = 3 \\ -\frac{|b|}{2} + a = 0 \end{cases}$

$2a = 3 \Rightarrow a = \frac{3}{2}$, $|b| = a \Rightarrow b = 3$ یا $b = -3$

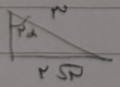
$T = \frac{\pi}{2} - \frac{\pi}{10} = \frac{2\pi}{5} = \frac{2\pi}{|4c|} \Rightarrow |c| = \frac{5}{4} = 0.75 \Rightarrow c = \frac{5}{4}$

$\frac{bc}{a} = \frac{3 \times \frac{5}{4}}{2} = \frac{15}{8}$

۹. چون برد تابع مثلثاتی ۳ شده و بعد به واحد منتقل شده به پایین، a و c تغییری نکرده

$f(x) = -3\cos(2x) - 1 \Rightarrow -2 = -3\cos(2x) - 1 \Rightarrow \cos(2x) = \frac{1}{3}$

$\frac{2\pi}{|b|} = \frac{2\pi}{\pi} = 2$



$\tan(2\alpha) = \frac{2\sqrt{2}}{1} = \sqrt{8}$

dotnote

Scanned with CamScanner

آیلا هروئینا

۱۰. $T=3 \rightarrow f(n)=f(n-3) \rightarrow -3\pi+0.5 \leq 3n \in [-1,2)$

$n \in \mathbb{Z}$

$-1 \leq -3\pi+0.5 < 3n < 2 \rightarrow \frac{3\pi+0.5}{3} < n \leq \frac{3\pi+0.5}{3} \rightarrow 0.5 < 3n \leq 3.5 + 3\pi$

$n=1,2 \rightarrow 0.5 < 3(1) + 0.5 - 3\pi < 2$

$f(1.5) = f(-3\pi+0.5) \rightarrow$ ضابطه $\rightarrow -\frac{1}{2}x+1 \rightarrow -\frac{1}{2}\times\frac{3}{2}+\frac{2}{2}$

$= \frac{-3}{4}+\frac{4}{4} = \frac{1}{4}$