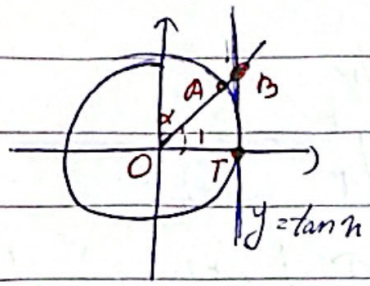
19,0

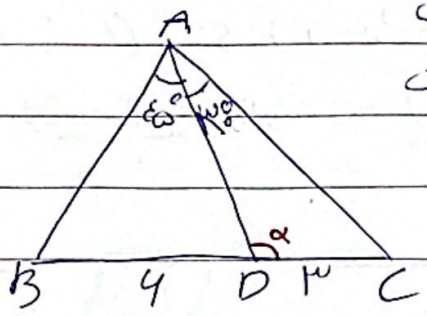


$\alpha+\beta=90^\circ$ (1)

$\tan\beta=\cot\alpha=BT$

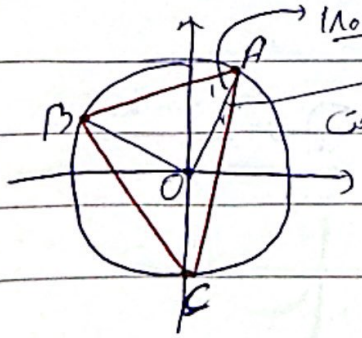
$OB^2=1+\cot^2\alpha=\frac{1}{\sin^2\alpha}\rightarrow OB=\left|\frac{1}{\sin\alpha}\right|=\frac{1}{\sin\alpha}$ ($\sin\alpha>0$)

$\rightarrow AB=\frac{1}{\sin\alpha}-1=\frac{1-\sin\alpha}{\sin\alpha}$ ✓ (۲)



$\frac{S_{ABD}}{S_{ADC}}=\frac{\frac{1}{2}\times BD\times h}{\frac{1}{2}\times CD\times h}\rightarrow\frac{BD}{CD}=\frac{4}{3}=\frac{2}{3}$

$\rightarrow\frac{\frac{1}{2}\times AB\times AD\times\sin 60^\circ}{\frac{1}{2}\times AC\times AD\times\sin 40^\circ}=2\rightarrow\frac{\sqrt{2}AB}{AC}=2,\ \frac{AB}{AC}=\sqrt{2}$ ✓ (۲)



$\frac{180-90}{2}=45^\circ\rightarrow\frac{180-100}{2}=40^\circ$ (۳)

$S_{ABC}=\frac{1}{2}\times AB\times AC\times\sin 40^\circ=\frac{1}{2}\times\sqrt{2}\times\sqrt{2+\sqrt{3}}\times\frac{\sqrt{3}}{2}$ (از ۱)

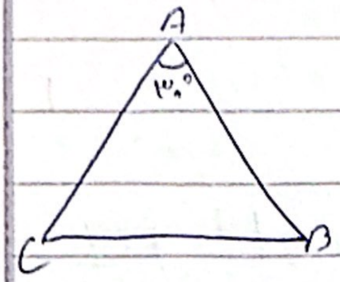
$\frac{\sqrt{12+4\sqrt{3}}}{8}=\frac{3+\sqrt{3}}{8}$ ✓

$AB=\sqrt{2}$, $BC=\sqrt{1+1-2\times(-\frac{1}{2})\times 1}=\sqrt{3}$, $AC=\sqrt{1+1-2\times 1\times(-\frac{\sqrt{3}}{2})}=\sqrt{2+\sqrt{3}}$

$\text{محیط}\rightarrow\sqrt{2}+\sqrt{3}+\sqrt{2+\sqrt{3}}$ ✓ (۲)

s.a.m

۴-



$AC = \log_3 16 = \log_3 2^4 = 4\log_3 2$

$BC = \log_2 27 = \log_2 3^3 = 3\log_2 3 = \dfrac{3}{\log_3 2}$ ۲

مساحت $ABC = \frac{1}{2} \times AB \times AC \times \sin \hat{A} = \frac{1}{2} \times 4\log_3 2 \times \dfrac{3}{\log_3 2} \times \sin 30 =$

$= \frac{1}{2} \times \frac{1}{2} \times 4 \times 3 = 3$ ✓

۵-

$2x^4 - x^2 - \sin^2(\alpha)(2\sin^2\alpha - 1)$ $\quad x - \cos x = 0 \to \cos x = x$

$2\cos^4\alpha - \cos^2\alpha - \sin^2\alpha(2\sin^2\alpha - 1) \to \cos^2\alpha(2\cos^2\alpha - 1) - \sin^2\alpha(2\sin^2\alpha - 1) \to$

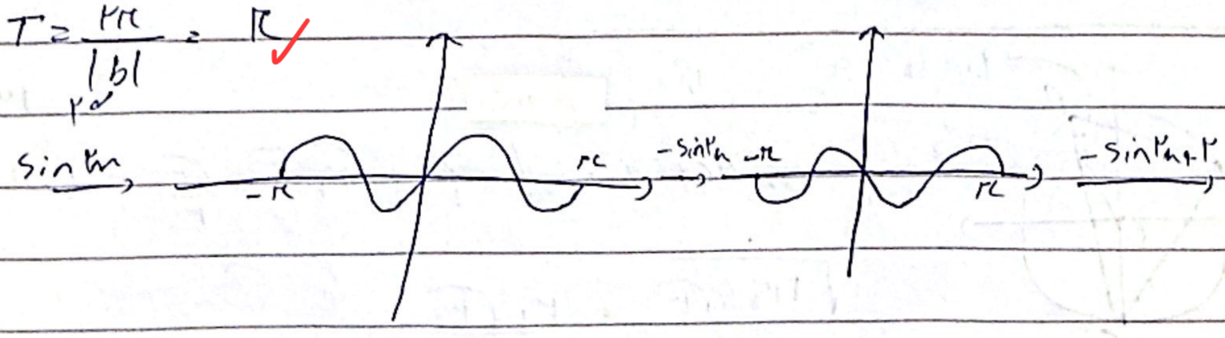
$2\cos^2\alpha - 1 = \cos 2\alpha \quad \cos^2\alpha(\cos 2\alpha) - \sin^2\alpha(-\cos 2\alpha) \Rightarrow \cos 2\alpha(\cos^2\alpha + \sin^2\alpha) = 1 \to$

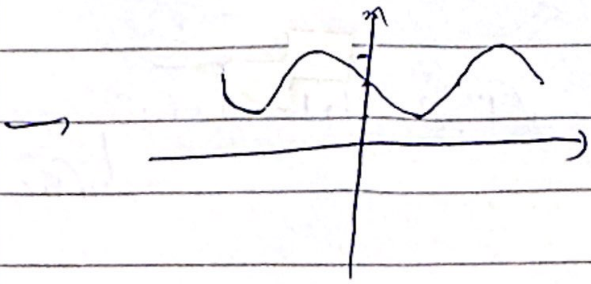
$\to \cos 2\alpha = 1 \quad \sin^2 2\alpha + \cos^2 2\alpha = 1 \to \sin 2\alpha = 0$ ✓ ۲

۶-

الف) $-2\sin x \cos x + 2 \quad [-\pi, \pi] \to -\sin 2x + 2$

$T = \dfrac{2\pi}{|b|} = \pi$ ✓ $\quad b = 2$





$R_f = [1, 3]$

قسمت ب صفحه بعد

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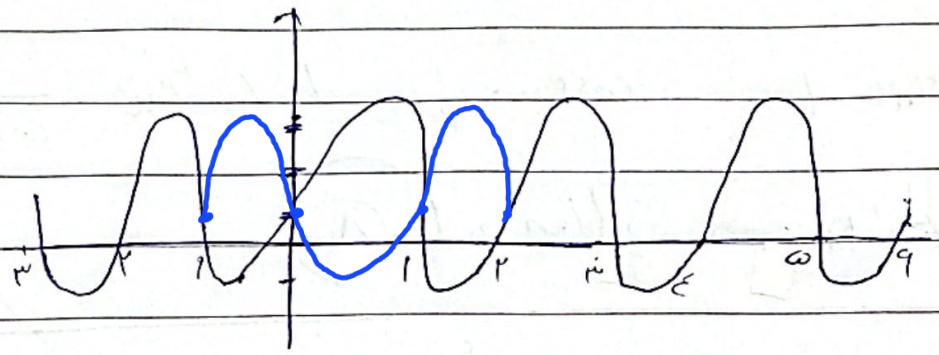
$y = 2\cos\left(x + \frac{1}{2}\right)\pi + 1 \quad [-\pi, 2\pi]$

$\downarrow$

$-2\sin \pi x + 1 \quad , T = \frac{2\pi}{|b|} = 2$ ✓ $\quad max = |-2| + 1 = 3$

$min = -|-2| + 1 = -1$



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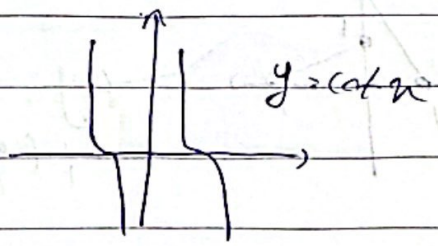
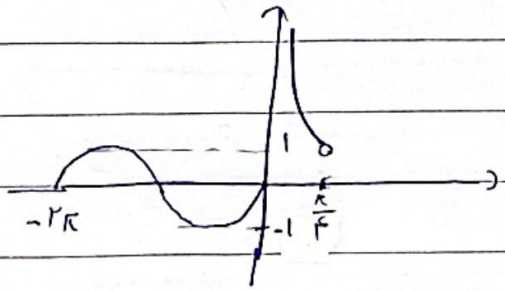
$$f(x) \begin{cases} \cot x & ; 0 < x < \frac{\pi}{2} \\ \sin x & ; x \leq 0 \end{cases}$$





$R_f = [-1, +\infty)$ ✓ (۲)

$f(x) = a + b\sin(cx)\cos(cx)\cos(2cx) \xrightarrow{cx=\alpha} f(\alpha) = a + b\sin\alpha\cos\alpha\cos(2\alpha)$

$\rightarrow a + b \times \frac{1}{2}\sin 2\alpha \rightarrow a + \frac{b}{2}\sin 2\alpha = a + \frac{b}{2}\sin 2cx$ ($\frac{1}{2}\sin 2\alpha$ / $\frac{1}{2}\sin 2\alpha$)

$max = \left|\frac{b}{2}\right| + a = 2$

$min = -\left|\frac{b}{2}\right| + a = 0 \rightarrow a = 2, b = 4$ $\quad T = \frac{\pi}{2} = \frac{\pi}{10} = \frac{2\pi}{\omega} \Rightarrow 2c = \omega \rightarrow c = \frac{\omega}{2}$

$\frac{bc}{a} = \frac{4 \times \frac{\omega}{2}}{2} = \omega$ ✓ (۲)

s.a.m

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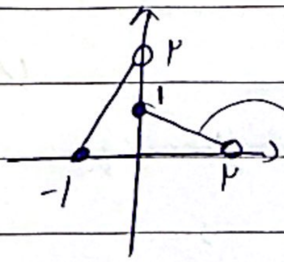
$$f(x) = a\cos bx + c \begin{cases} \to \max = |a| + c = 2 \\ \to \min = -|a| + c = -4 \end{cases} \to c = -1 ,\ a = -3$$

$$T = \pi = \frac{2\pi}{|b|} \to b = 2 \qquad f(x) = -3\cos 2x - 1$$

$$-3\cos 2x - 1 = 0 \to \cos 2x = -\frac{1}{3} \qquad 1 + \tan^2 2x = \frac{1}{\cos^2 2x} \to$$

$$\to 1 + \tan^2 2x = 9 \to |\tan 2x| = \sqrt{8}$$

$$T = 3 \qquad -34/5 + 1 = -\frac{33/5}{11T} \to f(34/5) = f(1/5) = 0/25$$



$$\to y = -\frac{1}{2}x + 1$$

$$-\frac{1}{2}\left(\frac{3}{2}\right) + 1 = \frac{1}{4}$$