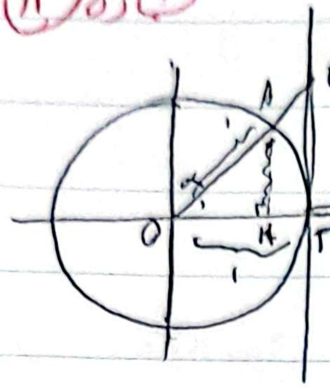
Subject: Date: 14,75

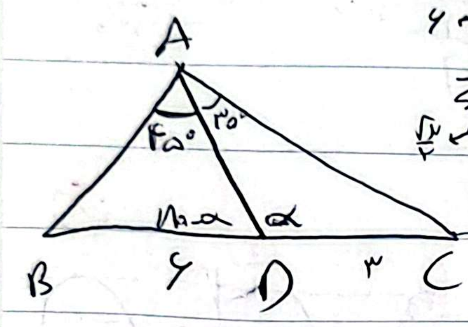
(۱۴) [illegible]



(۱) چون زاویه $\hat{O}$ = α داریم: $BT = \tan\hat{O}$, $BT = \cot\alpha$

فیثاغورس: $OT^2 + BT^2 = OB^2 = 1^2 + \cot^2\alpha = \dfrac{1}{\sin^2\alpha}$ (۲)

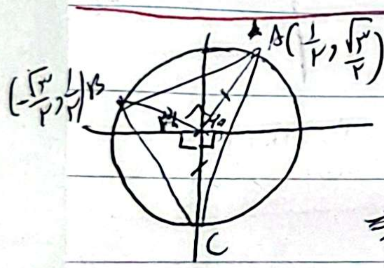
$\Rightarrow OB = \dfrac{1}{|\sin\alpha|} \xrightarrow{0<\alpha<90} OB = \dfrac{1}{\sin\alpha}$, $OB = AB + OA = AB + 1 \Rightarrow \boxed{AB = \dfrac{1}{\sin\alpha} - 1}$



(۲) $\dfrac{BD}{\sin 45^\circ} = \dfrac{AB}{\sin(180-\alpha)} \Rightarrow 6\sqrt{2} = \dfrac{AB}{\sin\alpha}$

$\dfrac{DC}{\sin 30^\circ} = \dfrac{AC}{\sin\alpha} \Rightarrow 6 = \dfrac{AC}{\sin\alpha}$

تقسیم: $\dfrac{6\sqrt{2}}{6} = \dfrac{\frac{AB}{\sin\alpha}}{\frac{AC}{\sin\alpha}} \Rightarrow \boxed{\sqrt{2} = \dfrac{AB}{AC}}$ (۲)

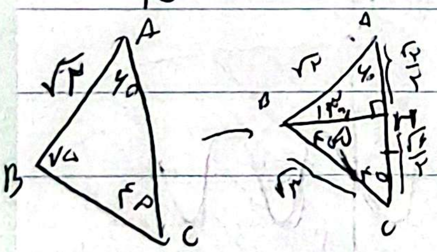


(۳) $B\hat{O}A = 180 - (60+30) = 90^\circ$, $OB = OC = 1 \Rightarrow O\hat{A}B = O\hat{B}A = 45^\circ$

$\Rightarrow AB = \sqrt{2}$, $OA = OC = 1 \Rightarrow O\hat{A}C = O\hat{C}A = \dfrac{180-(60+90)}{2} = 15^\circ$

$OC = OB = 1 \Rightarrow O\hat{B}C = O\hat{C}B = \dfrac{180-(60+60)}{2} = 30^\circ$

$\Rightarrow C\hat{A}B = 15 + 45 = 60^\circ$, $A\hat{B}C = 45 + 30 = 75^\circ$, $A\hat{C}B = 15 + 30 = 45^\circ$



ارتفاع AH را رسم می‌کنیم: (۲)

$\cos 60^\circ = \dfrac{1}{2} = \dfrac{AH}{AB} \Rightarrow AH = \dfrac{1}{2}AB = \dfrac{\sqrt{2}}{2}$

$\sin 60^\circ = \dfrac{\sqrt{3}}{2} = \dfrac{BH}{AB} \Rightarrow BH = \dfrac{\sqrt{3}}{2}AB = \dfrac{\sqrt{6}}{2}$, $CH = BH \Rightarrow CH = \dfrac{\sqrt{6}}{2}$

$\sin 45^\circ = \dfrac{\sqrt{2}}{2} = \dfrac{BH}{BC} \Rightarrow BC = BH \times \sqrt{2} = \sqrt{3}$

$S = \dfrac{1}{2} BH \times AC = \dfrac{1}{2} \times \dfrac{\sqrt{6}}{2} \times \left(\dfrac{\sqrt{2}}{2} + \dfrac{\sqrt{6}}{2}\right)$

[illegible] $= \sqrt{2} + \sqrt{2}\left(\dfrac{\sqrt{2}}{2} + \dfrac{\sqrt{6}}{2}\right)$

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(۴) $BC = \log_2^{27} = 3\log_2^3$, $AC = \log_3^{16} = 4\log_3^2$

(۴)

$S_{ABC} = \dfrac{1}{2} \times AC \times BC \times \sin\hat{C} = 6\sin\hat{C}$

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۵) به طور کلی ریشه x = cos α [illegible] (x = cos α) را جای‌گذاری [illegible]

$2\cos^4\alpha - \cos^2\alpha - \sin^2\alpha(2\sin^2\alpha - 1) = \cos^2\alpha(\underbrace{2\cos^2\alpha - 1}_{\cos 2\alpha}) - \sin^2\alpha(\underbrace{2\sin^2\alpha - 1}_{-\cos 2\alpha})$

$= \cos 2\alpha(\underbrace{\cos^2\alpha + \sin^2\alpha}_{1}) = 1 \Rightarrow$ (1,0) $\Rightarrow \boxed{\sin 2\alpha = 0}$ ✓ (2)

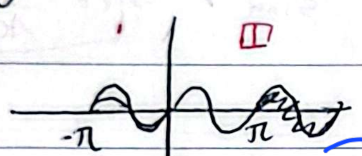
۶)

الف) $y = -2\sin x\cos x + 2 = -2\sin 2\alpha + 2$

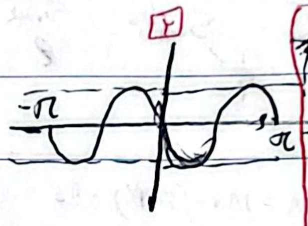
$y = \sin 2\alpha$

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

(1,75)

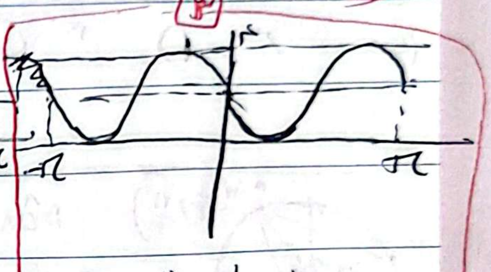


$R_f = [1, 3]$



$y = -2\sin 2\alpha$

۲ واحد انبساط عمودی و قرینه نسبت به محور طول‌ها



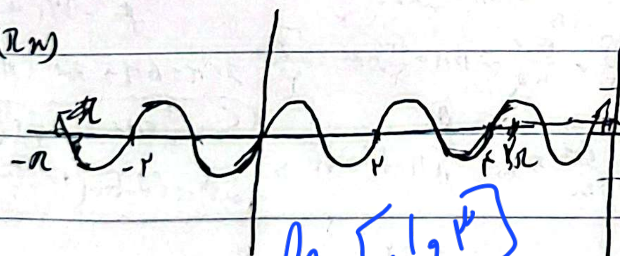
$y = -2\sin 2\alpha + 2$

۲ واحد به بالا

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

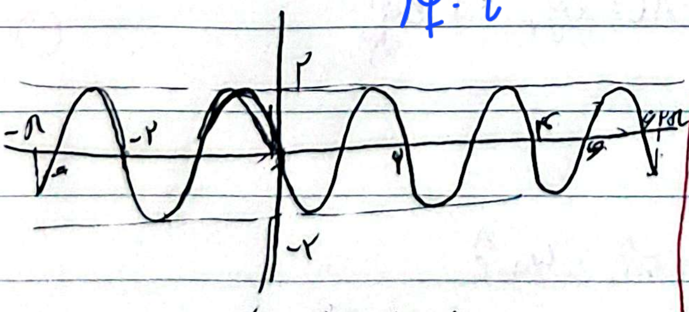
$y = \sin(\pi x)$

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



$R_f = [-1, 3]$

$y = -2\sin(\pi x)$



$y = -2\sin(\pi x) + 1$

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۰/۷۸

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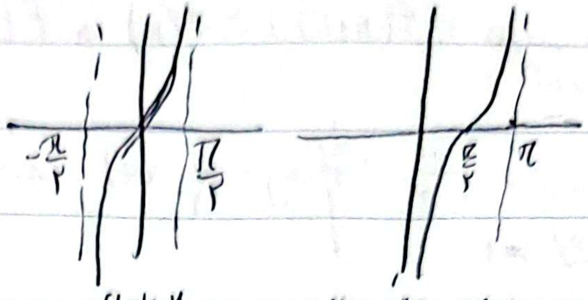
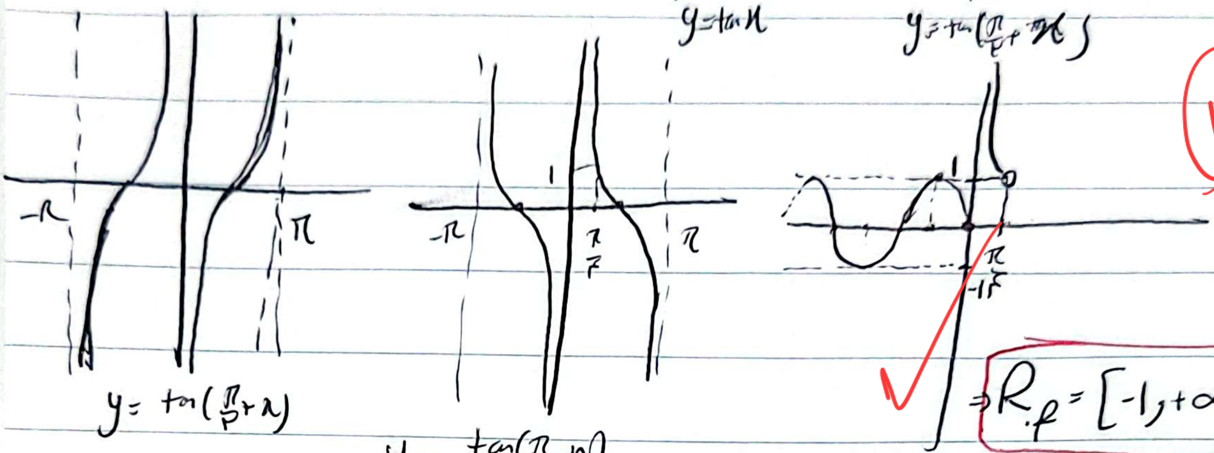
(۱)

$$f(x)=\begin{cases}\tan(\frac{\pi}{4}-x) & 0<x<\frac{\pi}{4}\\ \sin x & x\leq 0\end{cases}$$



$y=\tan x$ $y=\tan(\frac{\pi}{2}+x)$



$y=\tan(\frac{\pi}{2}+x)$

$y=\tan(\frac{\pi}{2}-x)$

قرینه نسبت به محور عرض‌ها

$\Rightarrow R_f=[-1,+\infty)$

(۲)

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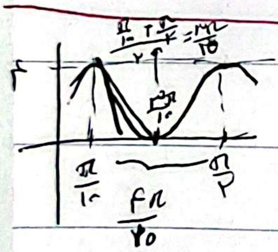
(۳)



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

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

$f(\frac{\pi}{2})=4\Rightarrow a+\frac{b}{4}\sin(2\pi c)=4\Rightarrow \boxed{a=4}$

$T=\frac{2\pi}{|4c|}=\frac{4\pi}{10}\Rightarrow 4|c|=5\Rightarrow |c|=\frac{5}{4}\xrightarrow{c>0}\boxed{c=\frac{5}{4}}$

(۲)

$f(x)=4+\frac{b}{4}\sin(5x)$, $f(\frac{3\pi}{10})=0\Rightarrow 4+\frac{b}{4}\sin(5(\frac{3\pi}{10}))=0\Rightarrow \underbrace{\sin(\frac{3\pi}{2})}_{-1}=-\frac{16}{b}$

$\Rightarrow \boxed{b=16}\Rightarrow \boxed{\frac{bc}{a}=\frac{16\times\frac{5}{4}}{4}=5}$

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(۹) (۲)

$\left.\begin{array}{l}\max=|a|+c=2\\ \min=-|a|+c=-4\end{array}\right\}\Rightarrow \boxed{c=-1},\ |a|=3\xrightarrow[\text{با نمودار صعودی}]{\text{شروع در نقطه max دارد}} a>0\Rightarrow \boxed{a=3}$

$\frac{2\pi}{|b|}=\pi\Rightarrow |b|=2\xrightarrow[\text{علامت تاثیری ایجاد نمی‌کند}]{\text{داخل کسینوس}} b=2$

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

$0=f(\alpha)\Rightarrow 3\cos 2\alpha-1=0\Rightarrow \cos 2\alpha=\frac{1}{3}\Rightarrow \cos^2 2\alpha=\frac{1}{9}\Rightarrow \frac{1}{\cos^2 2\alpha}=9=\tan^2 2\alpha+1\Rightarrow \tan^2 2\alpha=8\Rightarrow \boxed{|\tan 2\alpha|=2\sqrt{2}}$

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تعریف تابع متناوب با دوره تناوب T ($k \in \mathbb{Z}$) : $f(x+kT)=f(x) \Rightarrow f(-34/5)=f(-12(3)+1/5)=f(1/5)$ **10**

شیب خط در شکل $= \frac{1-0}{0-2} = -\frac{1}{2}$ ، عرض از مبدا $=1$ $\Rightarrow y = -\frac{1}{2}x+1 \Rightarrow f(\frac{3}{2}) = -\frac{1}{2}(\frac{3}{2})+1 = \boxed{\frac{1}{4}}$ ✓

۲

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