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سیدپارسا شمس‌نیا

1- $y=-\frac{1}{3}x^2+\frac{2}{5}x+1$

$\frac{-b}{2a}$ = $x_{\text{راس}}=\frac{-\frac{2}{5}}{2(-\frac{1}{3})}=\frac{-\frac{2}{5}}{-\frac{2}{3}}=\frac{3}{5}\rightarrow y_{\text{راس}}=-\frac{1}{3}\left(\frac{3}{5}\right)^2+\frac{2}{5}\left(\frac{3}{5}\right)+1=\frac{28}{25}$

راس اولیه $\rightarrow\left(\frac{3}{5},\frac{28}{25}\right)\xrightarrow{\text{منتقل بر }(3,4)}\left(4-\frac{3}{5},\,3-\frac{28}{25}\right)\rightarrow(h,k)=\left(\frac{17}{5},\frac{47}{25}\right)$

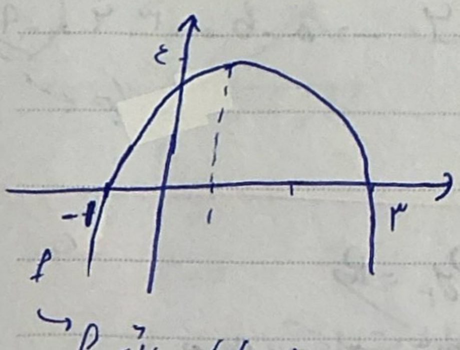
$y_{\text{جدید}}=-\frac{1}{3}\left(x-\frac{17}{5}\right)^2+\frac{2}{5}\left(x-\frac{17}{5}\right)+1+\frac{47}{25}$

$-\frac{1}{3}x^2+\frac{34}{15}x-\frac{289}{75}+\frac{2}{5}x-\frac{34}{25}+1+\frac{47}{25}\longrightarrow$

$\rightarrow y=-\frac{1}{3}x^2+\frac{8}{3}x-\frac{7}{3}\xrightarrow{\times -3}x^2-8x+7=0$

$x=\frac{8\pm\sqrt{64-28}}{2}=\frac{8\pm 6}{2}\rightarrow x=7,\ x=1$

2- $y=1-2f(3x+2)$



$\rightarrow f_{\text{راس}}=(1,4)$

$3x+2=1\rightarrow x=-\frac{1}{3},\ y=1-2f(1)=1-8=-7$

$A\left(-\frac{1}{3},-7\right)\rightarrow \alpha\beta=\frac{7}{3}$

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۳- $y = 3 - \sqrt{2m}$ $\xrightarrow{\text{۱ واحد چپ}}$ $3 - \sqrt{2(m+1)}$ $\xrightarrow{\text{نسبت به } Ox}$ $y = -(3 - \sqrt{2(m+1)})$ $\Rightarrow$

$\Rightarrow y = -3 + \sqrt{2(m+1)}$ $\xrightarrow{\text{۳ واحد بالا}}$ $y = \sqrt{2(m+1)} + 2$

$y = \sqrt{2(m+1)} + 2 = \frac{11}{2} \rightarrow \sqrt{2(m+1)} = \frac{7}{2} \rightarrow 2m+2 = \frac{49}{4} \rightarrow 2m = \frac{41}{4} \rightarrow$

$m = \frac{41}{8}$ ، جواب

۴- $D_f = (a, 6]$, $D_g = [-1, b)$ $D_y = (-2, 8)$ $a - b = ?$

$y = f(m-1) + g(m+1)$

$m+1 \in D_f$, $m-1 \in D_g$

$\{m \mid m-1 \in (a, 6]\}$, $\{m \mid m+1 \in [-1, b)\}$

$(a+1, 8]$ $\qquad$ $[-2, b-1)$ $\rightarrow (a+1, 8] \cap [-2, b-1) = (-2, 8)$

$a+1 = -2 \rightarrow a = -3$, $b-1 = 8 \rightarrow b = 9$ $\rightarrow a - b = -3 - 9 = -12$

جواب

۵-

$y = f(\frac{x}{2}+1)$ $\quad D_f = [-\frac{1}{2}, \frac{7}{2}]$

$R_f = [-1, 2]$ $\quad y_2 = \sqrt{|2f(x)-3|}$ $\quad D_{y_2} = ?$ $\quad R_{y_2} = ?$

عبارت روبه‌رو همواره برقرار است ولی توی نکته دامنه تابع $\mathbb{R}$ است. $|2f(x)-3| \geq 0$

چون f [illegible] به همین دلیل دامنه y_2 همان دامنه تابع $f(x)$ است یعنی

$D_{y_2} = [-\frac{1}{2}, \frac{7}{2}]$

$-1 \leq f(x) \leq 2 \rightarrow -2 \leq 2f(x) \leq 4 \rightarrow -5 \leq 2f(x) - 3 \leq 1$

$1 \leq |2f(x)-3| \leq 5$

$1 \leq \sqrt{|2f(x)-3|} \leq \sqrt{5}$

$R_{y_2} = [1, \sqrt{5}]$

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$f(x) = \log_2 x \xrightarrow{\text{۲ واحد به چپ}} \log_2(x+2) \xrightarrow{\text{قرینه نسبت به محور x}} -\log_2(x+2) \longrightarrow$ -۷

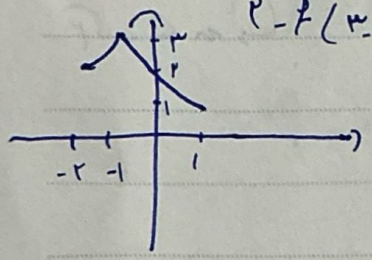
$\xrightarrow{\text{۳ واحد بالا}} -\log_2(x+2) + 3 \xrightarrow{\text{قرینه نسبت به y}} -\log_2((-x)+2)+3 = 3 - \log_2(2-x) = g(x)$

$2 - x > 0 \longrightarrow x < 2 \longrightarrow$ هر دو عدد ۱۴- و ۶۲- در دامنه اند

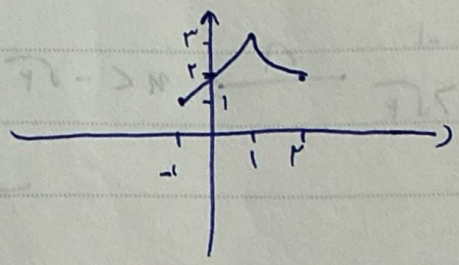
$g(-14) = 3 - \log_2 16 = 3 - 4 = -1$

$g(-62) = 3 - \log_2 64 = 3 - 6 = -3$ $\Big\} \longrightarrow -1 + (-3) = -4$ جواب

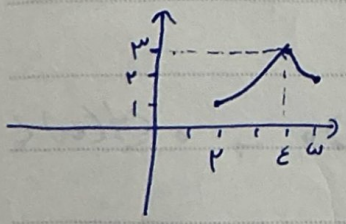
۱- $y = 2f(3-x)$



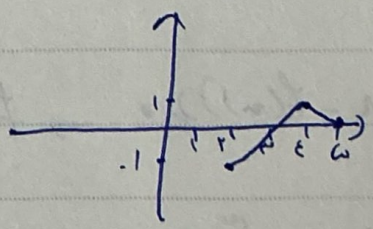
$y = 2f(x+3)$



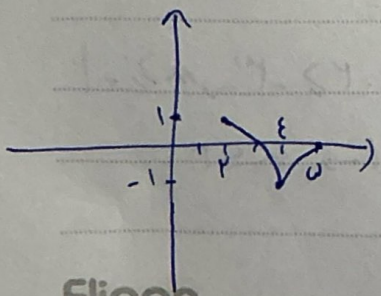
۲- $y = f(x)$



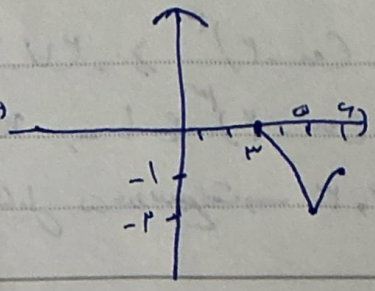
$y = -f(x)$



$y = f(x)$



$y = f(x-1) - 1$



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$f(x)=\left|\frac{x+1}{2x+1}\right| \xrightarrow{x\to x-2} g(x)=\left|\frac{(x-2)+1}{2(x-2)+1}\right|+1=\left|\frac{x-1}{2x-3}\right|+1$

$x\neq\frac{1}{2}$ ↪ $x\neq\frac{3}{2}$

$x+g(x)<0 \rightarrow x+\left|\frac{x-1}{2x-3}\right|+1<0$

$x+1<0 \rightarrow x<-1 \xrightarrow{\text{در این بازه}} x+1+\frac{x-1}{2x-3}<0 \longrightarrow$

$\rightarrow (x+1)(2x-3)+(x-1)>0 \rightarrow (x+1)(2x-3)=2x^2-x-3$

$2x^2-x-3+x-1=2x^2-4 \rightarrow 2x^2-4>0 \rightarrow x^2>2$ ↪ $x>\sqrt{2}$ ، $x<-\sqrt{2}$

① $x<-1$
② $|x|>\sqrt{2}$ $\xrightarrow{\cap}$ $x<-\sqrt{2} \rightarrow (-\infty,-\sqrt{2})$ ← جواب

۶۱- $g(x)=\sqrt{18f(x)-f^2(x)} \rightarrow 18f(x)-f^2(x)\geq 0$

$f(x)(18-f(x))\geq 0 \rightarrow f(x)\geq 0,\ 18-f(x)\geq 0 \rightarrow 0\leq f(x)\leq 18$

$f(x)=(x-2)^3+27 \rightarrow 0\leq (x-2)^3+27\leq 18$

$(x-2)^3+27\geq 0 \rightarrow (x-2)^3\geq -27 \rightarrow x-2\geq -3 \rightarrow x\geq -1$

$(x-2)^3+27\leq 18 \rightarrow (x-2)^3\leq -9 \rightarrow x-2\leq 1 \rightarrow x\leq 3$

$-1\leq x\leq 3$ ، شامل ۵ عدد صحیح است ← $-1, 0, 1, 2, 3$

Elipon