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الف) $f(x) = 2\sin^2(x + \frac{\pi}{4}) - 1$

$0 \leq \sin^2 x \leq 1$

$0 \leq 2\sin^2 x \leq 2$

$-1 \leq 2\sin^2 x - 1 \leq 1$

$R_f = [-1, 1]$

ب) $g(x) = 4\cos^2 x - 4$

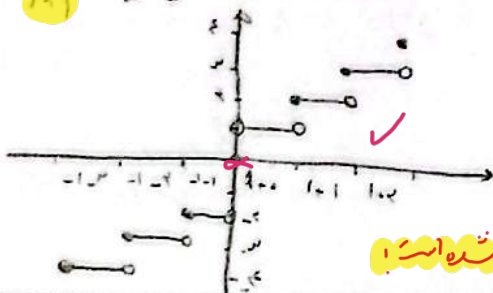
$-1 \leq \cos^2 x \leq 1$

$-4 \leq 4\cos^2 x - 4 \leq 0$

$R_g = [-4, 0]$

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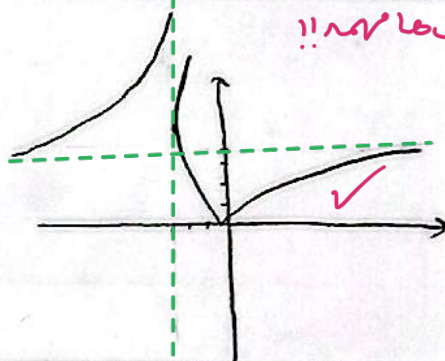
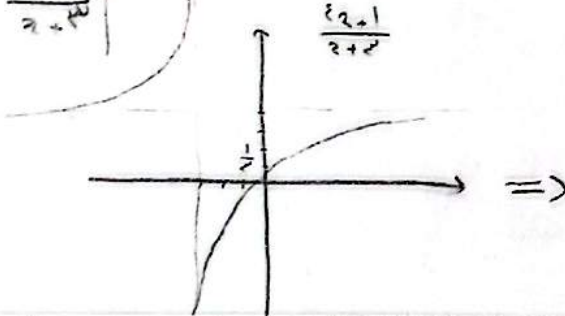
$y = \frac{x}{10} + [2]$



صورت تعریف شده است!

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$y = \left| \frac{x+1}{x-3} \right|$



رسم مجانب ها مهمه!!

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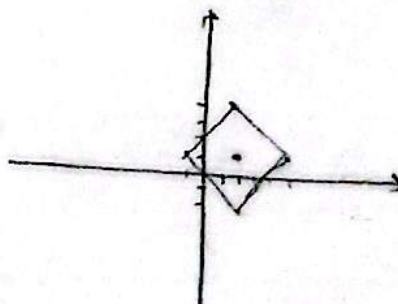
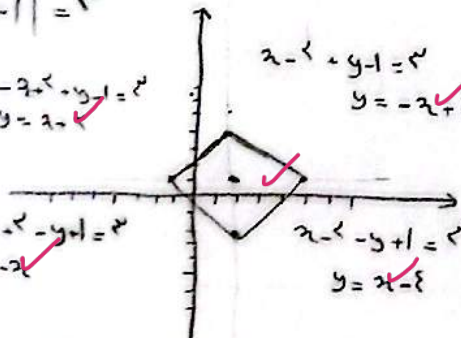
$|x-2| + |y-1| = 3$

$-x+2+y-1=3$
 $y=x+2$

$x-2+y-1=3$
 $y=-x+6$

$-x+2-y+1=3$
 $y=-x$

$x-2-y+1=3$
 $y=x-4$



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الف) $x + \frac{1}{2} + \sqrt{x + \frac{1}{2}} \Rightarrow x + \frac{1}{2} \geq 0 \Rightarrow x + \frac{1}{2} \geq 1 \Rightarrow 1 + \sqrt{2} \Rightarrow R_f = [1 + \sqrt{2}, +\infty)$

ب) $(1 - \sin^2 x)(1 + \sin^2 x) = 1 - \sin^4 x = 1 - (\sin^2 x)^2$
 $\Rightarrow R_g = [0, 1]$

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$$f(x) = -\frac{1}{2}x + 1, \quad D_f = [1, 9]$$

$$f(1) = -\frac{1}{2}(1) + 1 = \frac{1}{2}, \quad f(4) = -\frac{1}{2}(4) + 1 = -1, \quad \dots \quad f(9) = -\frac{1}{2}(9) + 1 = -\frac{7}{2}$$

$$\epsilon \times \frac{1}{2} = \frac{1}{2} \Rightarrow \frac{1}{2} = \frac{1}{2} = \boxed{\frac{1}{2}}$$

$$f(x) = \sqrt{ax^2 + bx + c}$$

$$D_f = [9, \infty) \Rightarrow a(x-4)^2 = ax^2 - 8ax + 16a \quad f(4) = 9a - 16a + 16a = 1$$

$$\Rightarrow a=1, \quad b=-8, \quad c=16$$

$$f(x) = \sqrt{bx^2 + ax - 16} = \sqrt{-8x^2 + x - 16} \rightarrow \begin{cases} -\frac{b}{2a} = \frac{1}{16} \\ -\frac{\Delta}{4a} = -\frac{121}{64} \end{cases} \Rightarrow \sqrt{(-\infty, \frac{1}{16})} \Rightarrow R_f = \boxed{(-\infty, \frac{1}{16})}$$

$$f(x) = \frac{x^2 - 8x}{x+4} = \frac{x(x-8)}{x+4} = x(x-4) \Rightarrow R_f = [-\frac{16}{5}, \infty) = [-3.2, \infty)$$

$$R_f = [9, \infty) - \{1\} \Rightarrow c = -1, \quad x(x-4) = 1$$

$$D_f = \mathbb{R} - \{a, b\} \Rightarrow a = -4, \quad b = 8 \quad x^2 - 4x - 16 = (x-4)(x+4)$$

$$f\left(\frac{a+b}{2c}\right) = \frac{8-4}{-2} = f(-1) = \frac{-1+8}{1} = \boxed{7}$$

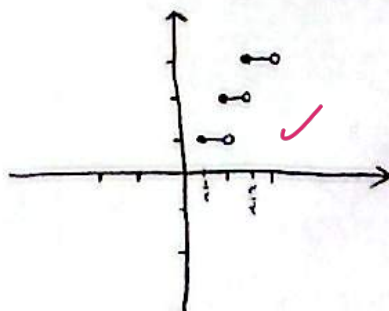
$$y = \sqrt{x^2 + ax^2 + bx - 16}$$

$$y = \sqrt{x^2 - 4x^2 + 12x - 16} \Rightarrow a = -4, \quad b = 12$$

$$D_f = [a, b] \Rightarrow \text{محدوده تعریف} \Rightarrow D_f = [-4, 12]$$

$$R_f = (-4, 4) \cup (4, 12) = \boxed{(-4, 12)}$$

$$y = [x] + \left[x + \frac{1}{x}\right]$$



داده شده

۷- با توجه به دامنه، زیر رادیکال یک خط با شیب مثبت بوده یعنی $a=0$ است و نقطه $(2,0)$ هم در معادله خط صدق می‌کند...

$$\begin{cases} (2,0) \rightarrow 2b+c=0 \\ (3,1) \rightarrow 3b+c=1 \end{cases} \rightarrow b=1 \text{ و } c=-2$$

$$g(x) = \sqrt{x^2+4} \rightarrow \text{ext} \Big|_4^0 \Rightarrow R_g = \sqrt{[4, +\infty)} = [2, +\infty)$$