

۱۵، ۷۵

$$f(x) - x + 1 \geq 0 \rightarrow f(x) \geq x - 1 \quad \begin{cases} x \geq 0 \rightarrow x - 1 \geq -1 \rightarrow x \geq 0 \rightarrow [0, +\infty) \\ x < 0 \rightarrow x - 1 > x - 1 \rightarrow x \geq -\frac{1}{2} \rightarrow [-\frac{1}{2}, 0) \end{cases}$$

$$(1) \cup (2) \rightarrow [-\frac{1}{2}, 0) \cup [0, +\infty)$$

صفحه آخر...

$$P(12x^3 + 12x^2 + 4x + 1) = P(x+1)^3 \quad (f(x) + f(x+1))^2 = ((x+1)^2)^2 = (x+1)^4$$

$$\rightarrow y = \frac{P(x+1)^3}{(x+1)^4} = \frac{3}{x+1} \rightarrow x+1 \neq 0 \rightarrow x \neq -\frac{1}{2} \rightarrow D = R - \{-\frac{1}{2}\}$$

$$x=0 \rightarrow f(0) = 2 = c \quad x=-1 \rightarrow \frac{2-a}{b-1} = \frac{2-1}{1} \Rightarrow b-1 = 2-a \Rightarrow b+a=3$$

$$x=1 \rightarrow \frac{a+2}{b+1} = \frac{1+2}{2} \rightarrow 2b+a+2=3 \Rightarrow 2b+a=1 \rightarrow P(b-a)=1 \rightarrow b-a=1$$

$$\rightarrow \begin{cases} a+b=3 \\ -a+b=1 \end{cases} \Rightarrow 2b=4 \Rightarrow b=2 \Rightarrow a=1 \quad b+c=\frac{1}{2}+2 \Rightarrow c=\frac{3}{2}$$

$$D_{f(x)} = D_{g(x)} \Rightarrow R - \{c\} = D_{g(x)} \rightarrow \text{مربع } g(x) \text{ متساوی}$$

$$\frac{x+1}{x-c} = \frac{(x-1)(x+1)}{x^2+ax+b} \Rightarrow (x-1)(x+1) = x^2+ax+b \xrightarrow{c=1} x^2+ax+b = x^2+x+1$$

$$\rightarrow \begin{cases} c=1 \\ a=-2 \\ b=1 \end{cases} \Rightarrow a+b+c=0$$

$$f(x+1) = (x+1-3)^3(x+1-1) = (x-2)^3(x) \quad f(x) = (x-3)^2(x-1)$$

$$f(1-x) = (1-x-3)^3(1-x-1) = (-x-2)^3(-x) = -x(-x-2)^3$$

$$g(x) = (x-2)^3(x) - (x)(-x-2)^3 = x(x^3+12x^2)$$

صفحه آخر...

$1-x = -1 \rightarrow x = 1 \rightarrow f(-1) = f \checkmark$ $1-x = 1 \rightarrow x = 0 \rightarrow f(1) = 1 \checkmark$ $\rightarrow f(0) + f(1) = d \checkmark$	2 6
$x + \sqrt{x} = 4 \rightarrow x + \sqrt{x} - 4 = 0. \xrightarrow{\sqrt{x}=t} t^2 + t - 4 = 0 \rightarrow t = \frac{-1 \pm \sqrt{17}}{2} \Rightarrow \sqrt{x} = \frac{-1 + \sqrt{17}}{2} \Rightarrow x = \left(\frac{-1 + \sqrt{17}}{2}\right)^2$ $\rightarrow f(4) = (f)^2 + 12 = \cancel{24}$ $24 + 12 = 36 \quad ! \checkmark$	1, 16 7
$f(1-x) = (1-x)^2 + 1-x = 1-x^2 - 2x + 1-x = -x^2 - 2x + 2$ $f(x-1) = (x-1)^2 + x-1 = x^2 - 2x + 1 + x - 1 = x^2 - x$ $\rightarrow f(1-x) + f(x-1) = 0 \checkmark$	2 8
$D_{f(x)} = f(x) \setminus \frac{a}{f}, x \in \frac{a}{f} \quad D_{g(x)} = b - f(x) \setminus \frac{b}{f}, x \leq \frac{b}{f} \quad D_{g(x)} \cap D_{f(x)} = \{1\}$ $\Rightarrow a = \frac{f}{f}, b = f \quad f(1) = 1\sqrt{f-a} + 1k - 1 \quad g(1) = \sqrt{b-f} + 1k$ $\rightarrow 1f - g = k \Rightarrow \frac{1\sqrt{f-a} + 1k - 1}{1} - \frac{\sqrt{b-f} + 1k}{1} = k \rightarrow 1k - 1k - k = 1 \rightarrow k = -1$ $\rightarrow \frac{a}{f} - k = f - 1 + 1 = 1 \checkmark$	2 9
$D_{f(x)} = m - x \setminus, x \leq m, D_{g(x)} = x \setminus, -1 \quad D_{g(x)} \cap D_{f(x)} = [-1, m] \Rightarrow m = 1 \checkmark$ $f(x) = 1 + x \quad g(x) = \sqrt{x}$ $f - g(x) = 4\sqrt{x} \Rightarrow 1 + x - \sqrt{x} = 4\sqrt{x} \rightarrow x = 4\sqrt{x} - 1$ $m + n = 1 + 4\sqrt{x} - 1 = 4\sqrt{x} \checkmark$	2 10

$$f(n) = \begin{cases} r_{n-1} & n \geq 0 \\ r_{n+1} & n < 0 \end{cases}$$

-1

$$\begin{cases} n \geq 0 \rightarrow y = \sqrt{r_{n-1} - n + 1} \rightarrow y = \sqrt{n} & n \geq 0 \xrightarrow{0} n \geq 0 \\ n < 0 \rightarrow y = \sqrt{r_{n+1} - n + 1} \rightarrow y = \sqrt{r_{n+1}} & n \geq -\frac{r}{r} \xrightarrow{0} -\frac{r}{r} \leq n \leq 0 \end{cases}$$

$$D_y = \left[-\frac{r}{r}, +\infty\right)$$

(۲) ضابطه های مساوی

$$f(n) = \begin{cases} \frac{(n-1)(r_{n+1} + r)}{(n-1)(n+1)} = n + r \\ \frac{an + r}{n + b} \end{cases}$$

$$f(1) = \frac{a+r}{1+b} = r \rightarrow a - rb = 1$$

$$f(-1) = \frac{-a+r}{-1+b} = 1 \rightarrow a + b = r$$

۳- برای تساوی روابط (۱) دامنه های برابر

$$n \neq \pm 1 \Rightarrow c = r$$

$$n = \pm 1$$

مقدار تابع در $n = \pm 1$ باید در روابط f و g برابر باشند:

$$\left\{ \begin{array}{l} \rightarrow a = r, b = 0 \rightarrow b + c = r, c \end{array} \right.$$

$$f(1-n) = (1-n-r)^r (1-n-1) = -n(n+r)^r$$

-2

$$f(n+1) = (n+1-r)^r (n+1-1) = n(n-r)^r$$

فرزواج

$$g(n) = n(n-r)^r - n(n+r)^r = n((n-r)^r - (n+r)^r) =$$

$$= n((n-r - n - r)(n-r + n + r)) = n(-2n) = -2n^2$$