

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

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

$$P(12x^3 + 12x^2 + 4x + 1) = P(x+1)^3 \quad (6x^2 + 6x + 1)^2 = ((x+1)^2)^2 = (x+1)^4$$

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

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

$$x=1 \rightarrow \frac{a+r}{b+1} = \frac{1+r}{r} \rightarrow r(b+1) = r(a+1) \rightarrow r(b-a) = 1 \Rightarrow \boxed{b-a = \frac{1}{r}}$$

$$\rightarrow \begin{cases} a+b=r \\ -a+b=\frac{1}{r} \end{cases} \Rightarrow r b = \frac{1}{r} \Rightarrow b = \frac{1}{r^2} \Rightarrow a = \frac{r}{r^2} \quad b+c = \frac{1}{r^2} + r \Rightarrow \left(\frac{11}{r^2}\right) \text{ جواب}$$

$$D_{f(x)} = D_{g(x)} \Rightarrow R - \{c\} = D_{g(x)} \rightarrow \text{مخرج } g(x) \text{ نباید 0 باشد}$$

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

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

$$f(x+1) = (x+1-r)^3 (x+1-1) = (x-r)^3 (x)$$

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

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

$1-x = -1 \rightarrow x = 1 \rightarrow f(-1) = f$ $1-x = 1 \rightarrow x = 0 \rightarrow f(1) = 1$ $\rightarrow f(0) + f(-1) = d$	6
$x + \sqrt{x} = 4 \rightarrow x + \sqrt{x} - 4 = 0 \xrightarrow{\sqrt{x}=t} t^2 + t - 4 = 0 \rightarrow t = \frac{-1 \pm \sqrt{1+16}}{2} \Rightarrow \sqrt{x} = 2 \rightarrow x = 4$ $\rightarrow f(4) = (f)^f + 12 = 2 \wedge 4$	7
$f(1-x) = (1-x)^f + 1-x = 1-x^f - f x^{f-1} + 1-x = -x^f + f x^{f-1} - f x + 1$ $f(x-1) = (x-1)^f + x-1 = x^f - 1 + f x^{f-1} - f x + x-1 = x^f - f x^{f-1} + f x - 1$ $\rightarrow f(1-x) + f(x-1) = 0$	8
$Df(x) = f_x - f_a, x > \frac{f_a}{f} \quad Dg(x) = b - f_x, x < \frac{b}{f} \quad D_{g(x)} \cap D_{f(x)} = \{f\}$ $\Rightarrow a = \frac{f}{f}, b = f \quad f_{(1)} = f \sqrt{f-f_a} + f k - f \quad g_{(1)} = \sqrt{b-f} + f k$ $\rightarrow f - g = k \Rightarrow \frac{f \sqrt{f-f_a} + f k - f}{f} - \frac{\sqrt{b-f} + f k}{f} = k \rightarrow f k - f k - k = f \rightarrow k = -1$ $\rightarrow f_a = \frac{b}{f} - k = f - f + 1 = 1$	9
$Df(x) = m - x, x \leq m \quad Dg(x) = x, x > -1 \quad D_{g(x)} \cap D_{f(x)} = [-1, m] \Rightarrow m = \sqrt{1}$ $f(x) = 1+x \quad g(x) = \sqrt{x}$ $f - g(x) = 4\sqrt{x} \Rightarrow 1+x - \sqrt{x} = 4\sqrt{x} \rightarrow x = 4\sqrt{x} - 1$ $m + n = 1 + 4\sqrt{x} - 1 = 4\sqrt{x}$	10