

۱۴, ۵, ۵
 $y = \sqrt{x f(x)}$
 $D_f = [-5, 0] \cup [5, 10]$
 $\begin{array}{c} 4 \quad -8 \quad 0 \quad 2 \quad 0 \\ 1 \quad -1 \quad +1 \quad -1 \quad +1 \end{array}$
 $\begin{array}{c} 1 \quad 2 \quad 0 \quad -5 \end{array}$

✓

۲
 $y = \sqrt{\frac{-x-0}{f(x)}}$
 $D_f = [-5, 0] \cup (0, 10]$
 $\begin{array}{c} -4 \quad 0 \quad 3 \quad 2 \quad 0 \quad 2 \quad 5 \\ + \quad + \quad - \quad - \quad + \quad + \quad + \end{array}$

حالت اول: $x > 0$ و $f(x) < 0$
 حالت دوم: $x < 0$ و $f(x) > 0$

$D_y = (-3, 2) - \{0\}$

۳
 $f(x) - 2f(2) = 2 - 4x + 4 \Rightarrow f(x) = 2 - 4x + 4 \Rightarrow f(x) = -4x + 6$
 ابتدا $f(2)$ را بیابیم:

$f(2) - 2f(2) = 2 \Rightarrow f(2) = -2 \Rightarrow f(x) = -4x + 6$

$f(-2) \Rightarrow f(-2) = (-2)^2 - 3(-2) = 10$

۴
 $a(n-1)^2 - b(n-1) + 2 = an^2 + bx + c = (x+1)^2$
 $x(-1a - b + b) + (a + b) = (x+1)^2$
 $a - b = -1$
 $f(x) = -x^2 + 7x + 2$

۱, ۲, ۵

۵
 $f(0) = 0 - \sqrt{0+1} = -1$ و $f(1) = 1 + \sqrt{1+1} = 1 + \sqrt{2}$
 $f(1) = 1 + \sqrt{2}$ و $f(0) = -1 \Rightarrow f(f(0)) = 1 + \sqrt{2}$
 $f(f(0)) = 1 + \sqrt{2}$ و $f(f(1)) = 1 + \sqrt{2}$

✓

$$f(x) = 9 - 9x + x^2 \quad f(-1) = 4 \quad f(1) = 1 \quad f(1) = 1 \Rightarrow f(1) = 1$$

$$\frac{f(1) - f(-1)}{f(1) - (-1)} = \frac{1 - 4}{1 - (-1)} = \frac{-3}{2} = -\frac{3}{2}$$

✓

$$f(x) = \sqrt{x} \quad f(-1) = 1 \quad f(1) = 1$$

$$\frac{f(1) - f(-1)}{f(1) - (-1)} = \frac{1 - 1}{1 - (-1)} = \frac{0}{2} = 0$$

✓

$$\frac{f(f(x)) - f(f(-1))}{f(1) - (-1)} = \frac{f(1) - f(-1)}{1 - (-1)} = \frac{1 - 1}{2} = 0$$

✓

$$f(x) = \frac{(x+1)^2}{(x-1)^2} \quad f(\sqrt{1}) = \frac{(\sqrt{1}+1)^2}{(\sqrt{1}-1)^2} = \frac{4}{0} = \infty$$

$$f\left(\frac{1}{\sqrt{1}}\right) = \frac{\left(\frac{1}{\sqrt{1}}+1\right)^2}{\left(\frac{1}{\sqrt{1}}-1\right)^2} = \frac{\left(\frac{1}{1}+1\right)^2}{\left(\frac{1}{1}-1\right)^2} = \frac{4}{0} = \infty$$

✓

$$f(x) = x + \frac{1}{x} \quad (x + \frac{1}{x})^2 - (x + \frac{1}{x}) = x^2 + \frac{1}{x^2} + 2 - x - \frac{1}{x} = x^2 - x + \frac{1}{x^2} - \frac{1}{x} + 2$$

$$(f(\sqrt{x}))^2 - f(x) = 1$$

✓

9. از اتحاد مربع دو جمله‌ای استفاده می‌کنیم:

$$f(n) = \frac{n^2 + 4n + 4}{n^2 + 4n + 5} = \frac{n^2 + 4n + 4 + 1}{n^2 + 4n + 4 + 1} = \frac{(n+2)^2 + 1}{(n+2)^2 + 1}$$

$$f(\sqrt{3}-2) = \frac{(\sqrt{3}-2+2)^2 + 1}{(\sqrt{3}-2+2)^2 + 1} = \frac{3 + 1}{3 + 1} = 1$$

$$f(f(\sqrt{3}-2)) = f(1) = \frac{(1+2)^2 + 1}{(1+2)^2 + 1} = \frac{10}{10}$$