

۱۳۵

۱- برای آنکه نبرد ایتال نباشد، تریا سادی معنی باشد باید x و $f(x)$ هم علامت باشند، پس:

$$\begin{array}{ccccccc} -4 & -5 & 0 & 2 & 5 \\ \hline // & - & + & - & + & // \end{array}$$

$$Dy = [-5, 0] \cup [2, 5]$$

۱

$$\frac{-x}{f(x)} \geq 0 \rightarrow \frac{x}{f(x)} \leq 0$$

۲

$$\begin{array}{ccccccc} -4 & -3 & 0 & 2 & 5 \\ \hline // & + & - & - & + & // \end{array}$$

حالت اول: $x > 0$ و $f(x) < 0$

۲

حالت دوم: $x < 0$ و $f(x) > 0$

۳- ابتدا $f(x) = x^2 - 3x$

$$f(2) - 2f(2) = 2 \rightarrow f(2) = -2 \rightarrow f(x) = x^2 - 3x$$

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

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

$$f(2) = 4 - 6 = -2$$

$$f(-2) = 4 - 6 = -2$$

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

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

$$f(2) = 4 - 6 = -2$$

$$f(-2) = 4 - 6 = -2$$

۳

۴- ابتدا $f(x) = x^2 - 3x$

$$f(2) = 4 - 6 = -2$$

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

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

$$f(2) = 4 - 6 = -2$$

$$f(-2) = 4 - 6 = -2$$

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

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

$$f(2) = 4 - 6 = -2$$

$$f(-2) = 4 - 6 = -2$$

۴

۵- ابتدا $f(x) = ax^2 + bx + c$

$$f(x-1) = a(x-1)^2 + b(x-1) + c = ax^2 - 2ax + a - bx + b + c$$

$$f(x+1) = a(x+1)^2 + b(x+1) + c = ax^2 + 2ax + a + bx + b + c$$

$$f(x-1) - f(x) = (ax^2 - 2ax + a - bx + b + c) - (ax^2 + 2ax + a + bx + b + c) = -4ax - 2b$$

$$-4a = 4 \rightarrow a = -1$$

$$a + b = 2 \rightarrow -1 + b = 2 \rightarrow b = 3$$

$$a - b = -1 - 3 = -4$$

۵

$f(k) = v(k) + 1 = 1^v \rightarrow k > v$ $f(-v) = (-v)^v = 1^v \rightarrow -1 < v$ $f(v) = v(v) + 1 = v$ $\frac{v(1^v) - v(1)}{v} = \frac{v \cdot 1 - v(1)}{v} = \frac{v \cdot 1 - v}{v} = \frac{v - v}{v} = \frac{0}{v} = 0$	✓
$f(w) = 9 \cdot 9 + 1 = 1$ $f(-1) = 1 + w + 1 = w$ $f(v) = k - 9 + 1 = -1 \rightarrow f^v(v) = (-1)^v = 1$ $\frac{v(1) + w}{1} = \frac{v + w}{1} = v$	✓
$f(v) = 9, f(w) = v, f(k) = 1, f(1) = 9$ $f(f(k)) - f(f(w)) = 9 - 9 = 0$ $f(1) - v = 9 - v = k$ $\frac{0}{k} = 0$	✓
$x^v + kx + w = (x+v)^v + 1$ $x^v + kx + 9 = (x+v)^v + w$ $x = \sqrt{w} - v \rightarrow x + v = \sqrt{w} \rightarrow y = (x+v)^v = (\sqrt{w})^v = w$ $f(\sqrt{w} - v) = \frac{w + w}{w + 1} = \frac{2w}{w + 1} = v$ $x = v \rightarrow x + v = k$ $y = (x+v)^v = k^v = 19$ $f(v) = \frac{(9 + w)}{19 + 1} = \frac{v}{1v}$	✓
$f(x) = x^v + \frac{1}{x^v}$ $f(\sqrt{x}) = (\sqrt{x})^v + \frac{1}{(\sqrt{x})^v} = x + \frac{1}{x}$ $(x + \frac{1}{x})^v = x^v + v x^{v-1} \cdot \frac{1}{x} + \frac{1}{x^v} = x^v + v + \frac{1}{x^v}$ $(f(\sqrt{x}))^v - f(x) = (x^v + v + \frac{1}{x^v}) - (x^v + \frac{1}{x^v}) = v$	✓