

الف) $y^3 - m = 2m^2 \rightarrow 2m^2 + m - y^3 = 0 \quad a=2 \quad b=1 \quad c=-y^3 \quad (1)$

$\Delta = b^2 - 4ac = 1 - 4(2)(-y^3) = 1 + 8y^3$

$1 + 8y^3 > 0 \rightarrow y > -\frac{1}{2} \quad \Delta > 0 \quad m = \frac{-1 \pm \sqrt{\Delta}}{4} = \frac{-1 \pm \sqrt{1 + 8y^3}}{4}$

$y = -\frac{1}{2} \quad \Delta = 0 \rightarrow m = -\frac{1}{4} \quad \Delta < 0 \rightarrow$ عددی ندارد

$\Delta \geq 0 \quad 1 + 8y^3 \geq 0 \quad y \geq -\frac{1}{2} \quad [-\frac{1}{2}, \infty) \quad$ تابع هست ✓

ب) $|y| + m^2 = m + 3 \rightarrow m^2 - m + (|y| - 3) = 0 \quad a=1 \quad b=-1 \quad c=|y|-3$

$\Delta = b^2 - 4ac = (-1)^2 - 4(1)(|y|-3) = 1 - 4|y| + 12$

$\Delta \geq 0 \rightarrow 13 - 4|y| \geq 0 \rightarrow |y| \leq \frac{13}{4} \quad y \in [-\frac{13}{4}, \frac{13}{4}] \quad$ تابع نیست ✗

ج) $\sqrt{m-4} + |y-2| = 0 \quad \sqrt{m-4} = 0 \quad |y-2| = 0$

$\downarrow$
 $m=4$

$\downarrow$
 $y=2$

$(4, 2)$

تابع هست ✓

د) $m = \cos y \quad \cos^2 y + \sin^2 y = 1 \quad \sin^2 y = 1 - m^2$

$1 - m^2 \geq 0 \rightarrow m^2 \leq 1 \quad -1 \leq m \leq 1$

$y = \arccos(m) + 2k\pi$

$y = -\arccos(m) + 2k\pi$

$m=1$

$m=-1$

✗. تابع نیست

الف) $y = \frac{m+4}{m^2-4m} \quad m^2 - 4m \neq 0 \rightarrow m(m-4) \neq 0$ (2)

$m \neq 0 \quad m \neq 4 \quad D_y = \mathbb{R} - \{0, 4\}$

ب) $y = \frac{m+4}{m^2-5m+14} \quad m^2 - 5m + 14 \neq 0$

$\Delta = (-5)^2 - 4 \times 1 \times 14 = 25 - 56 = -31 < 0 \rightarrow \Delta < 0$

$D = \mathbb{R}$

فرمود ✓

ج) $y = \frac{m+4}{m^2+m+4} \quad m^2 + m + 4 \neq 0 \quad \Delta = b^2 - 4ac$

$1 - 4 \times 1 \times 4 = 1 - 16 = -15 < 0$

$$2) \frac{n+2}{n^2-2n} \quad n^2-2n \neq 0 \quad \frac{n^2-2n}{n^2(n-2)(n+2)} = \frac{n^2-2n}{n^2(n-2)(n+2)}$$

$$n=0 \quad n=2 \quad n=-2 \quad Dy = \mathbb{R} - \{-2, 0, 2\}$$

$$y = \sqrt{4-n} + \sqrt{n-2} \quad 4-n \geq 0 \quad n \leq 4 \quad (P)$$

$$2 \leq n \leq 4 \quad n-2 \geq 0 \quad n \geq 2 \quad Dy = \{2, 4\}$$

$$y = \frac{3n+1}{n^2+1} \quad n^2+1 \neq 0 \quad Dy = \mathbb{R}$$

$$y = \frac{\sqrt{n-2}}{n-2} \rightarrow n-2 \geq 0 \rightarrow n \geq 2 \quad n-2 \neq 0 \quad n \neq 2$$

$$Dy = [2, \infty) \cup (2, \infty)$$

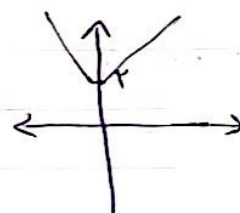
$$y = \frac{4n+3}{|n|+n^2} \quad |n|+n^2 \neq 0 \quad |n|+n^2 = n+n^2 = n(n+1)$$

$$n=0 \quad n=-1$$

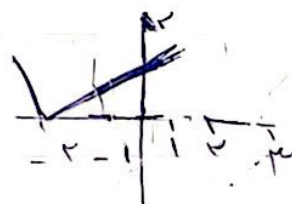
$$|n|+n^2 = -n+n^2 = n^2-n = n(n-1) \rightarrow n=0 \quad n=1$$

$$Dy = \mathbb{R} - \{0\}$$

$$الف) y = |n| + 2$$

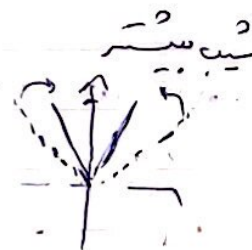
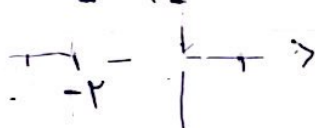


$$ب) y = 2|n| \rightarrow n=1 \rightarrow y=2 \quad n=-1 \rightarrow y=2$$



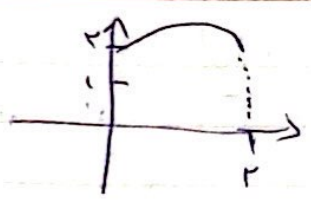
$$y = |n+2|$$

$$y = |n+2| + 2$$



(a)

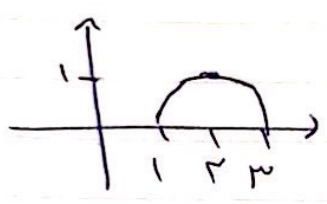
الف)



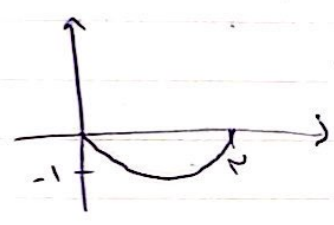
ب)



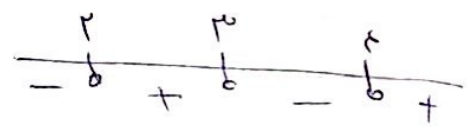
ج)



د)



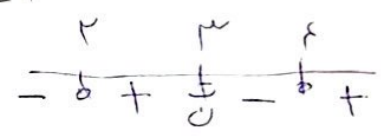
$$y = (x-2)(x-3)(x-4) \quad x=2 \quad x=3 \quad x=4 \quad (9)$$



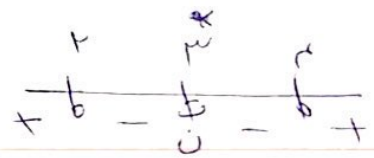
$$y = (x-2)(x-3)^2(x-4) \quad x=2 \quad x=3 \quad x=4$$



$$y = \frac{(x-2)(x-4)}{x-3} \rightarrow x=2 \quad x=4 \quad x=3 \quad (10)$$



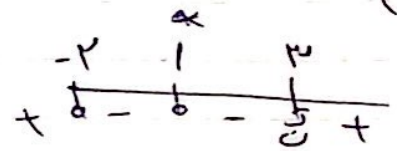
$$y = \frac{(x-2)(x-4)}{(x-3)^2} \quad x=2 \quad x=4 \quad x=3$$



$$y = \frac{n^2 - 3n + 2}{n - 2}$$

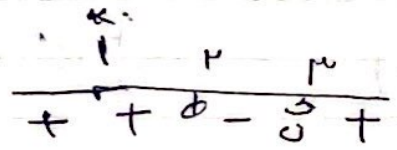
$$y = \frac{(n-1)(n+2)}{n-2}$$

(1)



$$y = \frac{n^2 - 3n + 2}{n^2 - 4n + 6}$$

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



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الف) $\frac{n^2 - n}{n^2 + n + 2} = \frac{n^2(n^2 - 1)}{n^2 + n + 2} \rightarrow \frac{n^2(n+1)(n-1)}{n^2 + n + 2}$

(9)



$$\Delta = b^2 - 4ac$$

$$1 - 1 = -1$$

$$\Delta < 0 \text{ ، } \Delta < 0 \text{ ، } \Delta < 0$$

ب) $\frac{n^2 - 3n + 2}{n^2 + 2n + 2}$

$$\Delta = b^2 - 4ac \rightarrow 2^2 - 4 \times 1 \times 2 = 4 - 8 = -4$$

$$n^2 + 2n + 2 > 0 \text{ ، } \Delta < 0 \text{ ، } \Delta < 0$$

$$\Delta = b^2 - 4ac = 2^2 - 4 \times 1 \times 2 = 4 - 8 = -4$$

$$\frac{n^2 + 2n + 2}{n^2 + 2n + 2} > 0$$

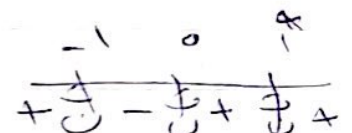


الف) $\frac{n^2 - 1}{n^2 - 2} \geq 0$

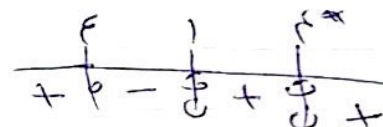
$$n(n^2 - 1) = n^3 - n = n(n-1)(n+1)$$

(10)

$$(-\infty, -1) \cup (0, 1) \cup (1, +\infty)$$



ب) $\sqrt{\frac{n^2 - 12}{n^2 - 2n + 2}} = \frac{(n-4)(n+4)}{(n-1)(n-2)}$



$$(-\infty, -4] \cup (1, 2) \cup (2, +\infty)$$