

1) A. $x^3 - 3x^2 + 3x \rightarrow \mathbb{R}$ توان فرد

B. $y = \frac{1}{x^2 - 2x} = yx^2 - 2xy = 1 \Rightarrow yx^2 - 2xy - 1 = 0$

$\Delta = 4y^2 - 4(y)(-1) = 4y^2 + 4y > 0$

$4y(y+1) > 0 \Rightarrow y < -1 \text{ or } y > 0 \Rightarrow R = (-\infty, -1] \cup (0, +\infty)$

2) الف) $x^2 - 4x + 1$ $\frac{-b}{2a} = -\frac{-4}{2} = 2$ (2)

$4 - 8 + 1 = -3$ $a > 0 \rightarrow \min [6, +\infty)$

ب) $-x^2 + 4x + 3$ $a < 0 \rightarrow \max$

$\frac{-b}{2a} = -\frac{4}{-2} = 2 \Rightarrow R_f = (-\infty, 2]$

$-9 + 11 + 3 = 5$

ج) $\sqrt{x^2 - 4x - 4}$

$\Rightarrow \sqrt{(x-2)^2 - 8}$

$\frac{-b}{2a} = -\frac{-4}{2} = 2$ (2)

$\sqrt{[-2, +\infty)} \Rightarrow [0, +\infty)$

$\frac{y}{2} = \frac{4 - 11 - 3}{-2} = (-1)$

د) $y = \sqrt{4x - x^2}$ $a < 0 \rightarrow \max$

$y = \sqrt{-x^2 + 4x}$

$\frac{-b}{2a} = -\frac{4}{-2} = 2 \Rightarrow R = [0, 4]$

3) الف) $\mathbb{R}$

$\rightarrow \mathbb{R}$

$$Z = \sqrt{\mathbb{R}} = [-9 + \infty)$$

$$Z = \mathbb{R}^c \quad (n^2 - 2n^2 + n + 1)^c \Rightarrow [0, 9 + \infty)$$

4) الف) $y = \frac{3n+1}{n-2} \rightarrow \mathbb{R} - \{3\}$

$$yn - cy = cn + 1$$

$$-cy = cn - yn + 1$$

$$-cy = n(c - y) + 1$$

$$-cy - 1 = n(c - y)$$

$$\frac{cy+1}{c-y} \rightarrow \mathbb{R} - \{c\}$$

$$\hookrightarrow \frac{cn+1}{n+1} \rightarrow \begin{matrix} a=c \\ c=1 \end{matrix} \quad \mathbb{R} - \{c\}$$

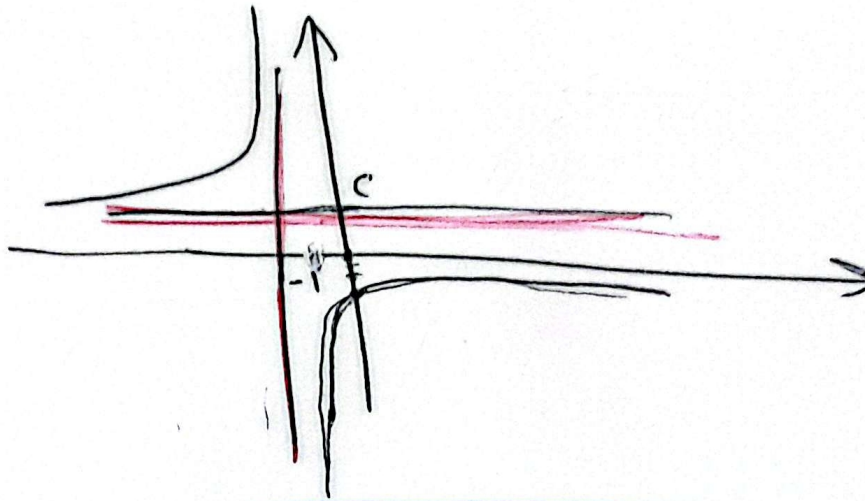
5) الف) $\sqrt{\frac{cn+1}{n+1}} \xrightarrow{c(n+1)} \sqrt{\mathbb{R} - \{c\}} = [0, 9 + \infty) - \{\sqrt{c}\}$

$$\hookrightarrow \sqrt{\frac{cn+1}{c-n-n+c}} \rightarrow \sqrt{\mathbb{R} - \{c\}} \rightarrow [0, 9 + \infty)$$

6 = الف = $y = 2x - 2$

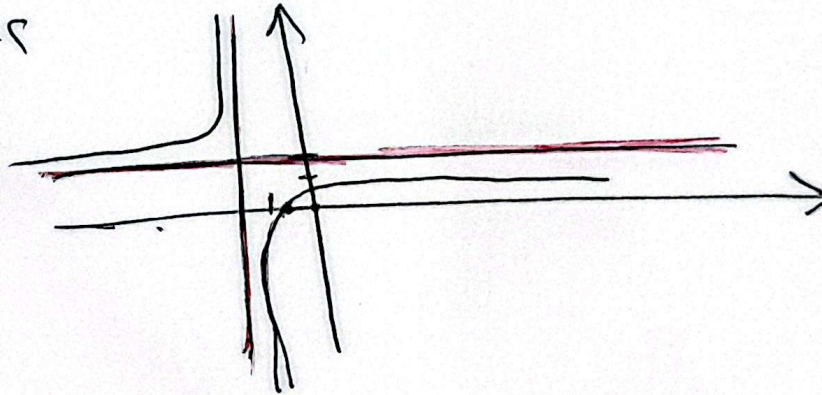
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افق $\rightarrow y = \frac{a}{c} = \frac{2}{1} = 2$



$x = 0 \rightarrow y = -2$

ب) $y = \frac{2x - 1}{x + 2}$ $z = -2$ $افق = 2$



$x = 0$
 $y = -\frac{1}{2}$

7) $\lim_{x \rightarrow \infty} x + \frac{1}{x} \xrightarrow{\text{Cov. Prop.}} -\frac{1}{x} + \rightarrow R_f = (-\infty, -1] \cup (1, \infty)$

8) $y = \frac{x^4 + 1}{x^4} \Rightarrow x^4 + \frac{1}{x^4} \rightarrow (-\infty, -1] \cup (1, \infty)$

9) $y = \frac{\sqrt{x^5}}{\sqrt{x}} + \frac{1}{\sqrt{x}} \Rightarrow \sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow (-\infty, -1] \cup (1, \infty)$

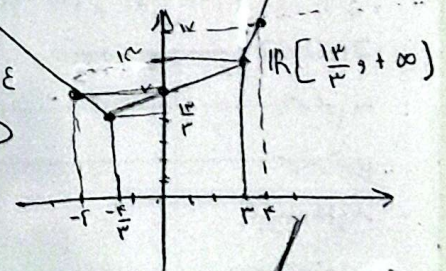
10) $y = \sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow [1, \infty)$

11) $y = x^c + \frac{1}{x^c + 1} \rightarrow \frac{1}{x^c} + \frac{1}{x^c} \rightarrow [\frac{1}{x^c}, \infty)$

12) $y = \frac{x^c + 1}{\sqrt{x^c + 1}} \Rightarrow \frac{x^c + 1 + 1}{\sqrt{x^c + 1}} = \sqrt{x^c + 1} + \frac{1}{\sqrt{x^c + 1}} \Rightarrow IR = [\frac{2}{x^c}, \infty)$

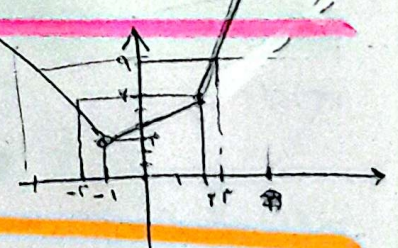
13) $y = |x - c| + |x + c|$
 $\frac{-c}{x} - \frac{c}{x} + \frac{2c}{x}$

14) $-c \quad -\frac{c}{x} \quad c \quad x$
 $-x + c - x - c = -2x$
 $-x + c + x + c = 2c$
 $x - c + x + c = 2x$



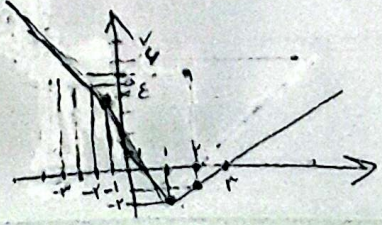
15) $|x - c| + |x + c|$
 $R = [c, \infty)$

16) $-c \quad -1 \quad 1 \quad c$
 $-x + c - x - c = -2x$
 $-x + c + x + c = 2c$
 $x - c + x + c = 2x$



17) $|x - c| + |x + c|$
 $R = [-c, \infty)$

18) $-c \quad -1 \quad 1 \quad c$
 $-x + c - x - c = -2x$
 $-x + c + x + c = 2c$
 $x - c + x + c = 2x$



19) $R = [-c, \infty)$