

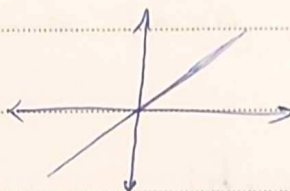
الف) $y''' - y'' = y' - 1 \Rightarrow \begin{cases} y_1''' = y_1'' + y_1' - 1 \\ y_2''' = y_2'' + y_2' - 1 \end{cases} \rightarrow y_1''' = y_2''' \Rightarrow y_1 = y_2$ (ر)

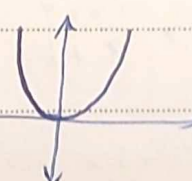
تابع مستقيم ✓
ب) $x \cos y = y \cos x$ $x \cos y \leq 0 \times y$ $\leftarrow x = \frac{\pi}{2}$ مثال نقض
 $y = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \dots$

تابع نسبي ✓
ج) $\frac{x+y}{y} = \sqrt{xy}$, $x, y > 0 \rightarrow x+y - 2\sqrt{xy} \geq 0 \rightarrow (\sqrt{x} - \sqrt{y})^2 \geq 0$

$\rightarrow \begin{cases} \sqrt{y_1} = \sqrt{x} \\ \sqrt{y_2} = \sqrt{x} \end{cases} \rightarrow \sqrt{y} = \sqrt{x} \xrightarrow{\text{تربيع}} |y| = |x| \xrightarrow{y > 0} y_1 = y_2$

تابع مستقيم ✓
د) $x y'' + y' - y''' - y = 0 \rightarrow x(y'' + y') = y''' + y \rightarrow x = \frac{y(y'' + y')}{y'' + y}$

$y' \neq 0 \rightarrow x = y$  تابع مستقيم ✓

الف) $|x| + x^2 \leq y$ $x^2 \geq 0, |x| \geq 0 \rightarrow y \geq 0$  تابع مستقيم ✓
 $\Rightarrow y + x^2 \leq y \rightarrow y = x^2$ (ر)

ب) $[y] + [x] = 1$ $[y] \leq 1 \leftarrow [x] \leq 0 \leftarrow x = 0$ مثال نقض
 $\downarrow$
 $y \in \mathbb{Z} \Rightarrow (0, 1), (1, 0), (2, -1), \dots$ تابع نسبي ✓

$$|n-1| \geq r \rightarrow \begin{cases} n-1 \geq r \rightarrow n \geq r+1 \\ n-1 \leq -r \rightarrow n \leq -1 \end{cases}$$

(r) r

$$f(n) = \begin{cases} r^2 - b & n \geq r, n \leq -1 \\ a + rn & 0 \leq n \leq r \end{cases} \xrightarrow{n=r} r^2 - b = a + rn \rightarrow r^2 - b = a + r \cdot r \rightarrow r^2 - b = a + r^2 \rightarrow \boxed{a+b=1} \checkmark$$

$$f(n) = \sqrt{a-bn-n^2} \quad \frac{b}{-1} \frac{a}{-1} \leftarrow -n^2 - bn + a \geq 0$$

(r)

$$\text{or } (0, 2) \rightarrow a, b \quad S = a+b = -b \rightarrow a = -2b \xrightarrow{b=1} \boxed{a=-2} \checkmark$$

$$P = ab = -a \xrightarrow{a \neq 0} \boxed{b=-1} \checkmark$$

$$\boxed{a+b=1} \checkmark$$

$$y = \frac{r}{\sqrt{an^2 + bn + c}} \quad an^2 + bn + c > 0 \quad \frac{r}{+ \quad -} \quad \text{---d}$$

(r)

$$y = bn + c \xrightarrow{n=r, y=0} 0 = rb + c \rightarrow \boxed{c = -rb} \quad \boxed{a \leq 0} \leftarrow \text{or } (2, 1) \checkmark$$

$$\boxed{\text{or } (2, 1) \rightarrow b \neq 0}$$

$$ra + c - r/|b| = 0 \rightarrow rb \cdot r(-b) = +b \checkmark$$

$$y = \sqrt{\frac{rn+r}{n+b}} + a \rightarrow \frac{rn+r}{n+b} + a \geq 0 \rightarrow \frac{(r+a)n + r+ab}{n+b} \geq 0 \quad \text{---s}$$

(r)

$$\frac{r}{- \quad +} \quad n = r \text{ or } -r \rightarrow r+b \leq 0 \rightarrow \boxed{b \leq -r} \checkmark$$

$$\text{or } (2, 1) \rightarrow \frac{r}{n+b} \geq 0 \rightarrow a + \frac{r}{n+b} \geq 0 \rightarrow \boxed{a > -r}$$

$$\Rightarrow \frac{1}{n-r} \geq 0 \quad \frac{r}{- \quad +}$$

— Arman —

الف) $y = \sqrt{n^2 - n}$ $n^2 - n \geq 0$ $n(n-1) \geq 0$ $n(n+1)(n-1) \geq 0$ ✓
(r)

$\frac{-1}{-1} + \frac{0}{0} + \frac{1}{1} \Rightarrow D_f = [-1, 0] \cup [1, +\infty)$ ✓

—) $y = \frac{1}{\sqrt{|n|-1}}$ $|n|-1 \geq 0 \rightarrow |n| \geq 1$ $\begin{cases} n \geq 1 \\ n \leq -1 \end{cases}$

$D_f = (-\infty, -1) \cup (1, +\infty)$ ✓

الف) $y = \sqrt{\frac{1}{|n| - [n]}}$ $\rightarrow D_f = \mathbb{R} - \left(\underbrace{\mathbb{Z}^+ \cup \{0\}}_{\mathbb{W}} \right)$ ✓
(r)

$|n| = [n] \xrightarrow{n \in \mathbb{Z}} |n| = n \Rightarrow n \geq 0$

—) $\sqrt{n} + \sqrt{y} = 9 \rightarrow \sqrt{y} = 9 - \sqrt{n}$ $[n \geq 0]$

$9 - \sqrt{n} \geq 0 \rightarrow 9 \geq \sqrt{n} \rightarrow 1 \geq |n|$

$D_f = [0, 1]$ ✓

$\begin{matrix} |n| \geq 0 \\ |n| \leq 1 \end{matrix} \Rightarrow \boxed{0 \leq n \leq 1}$

$\left[\sqrt{n - \frac{1}{r}} \right] + \left[\sqrt{n + r - \frac{1}{r}} \right] \geq 0 \rightarrow \left[\sqrt{n - \frac{1}{r}} \right] \geq -r \rightarrow \left[\sqrt{n - \frac{1}{r}} \right] \geq -1$ ✓
(r)

$\rightarrow 0 \leq \sqrt{n - \frac{1}{r}} \rightarrow \frac{1}{r} \leq n$ $D_f = \left[\frac{1}{r}, +\infty \right)$ ✓
(r)

$1 - \log(\sqrt{n-a}) \geq 0 \rightarrow \sqrt{n-a} \leq 1 \rightarrow n \leq \frac{1+a}{r}$ $D_f = (b, c]$
 $\begin{matrix} \downarrow \frac{1+a}{r} \\ \downarrow \frac{1+a}{r} \end{matrix}$
 $\begin{matrix} \downarrow \frac{a}{r} \\ \downarrow \frac{1+a}{r} \end{matrix}$

Arman

$c - b = \frac{1+a}{r} - \frac{a}{r} = \frac{1}{r} \leq 1$ ✓