

Functii- Aplicatii

$$\text{Im } f = \{f(x) | x \in A\}$$

① $f: \{-2, -1, 0, 2\} \rightarrow \mathbb{R}$

$$f(x) = -2x + 1$$

a) $\text{Im } f$

b) GP

$$A = \{-2, -1, 0, 2\}$$

② $g: \{-2, -1, 0, 1, 2\} \rightarrow \mathbb{R}$

$$g(x) = |x|$$

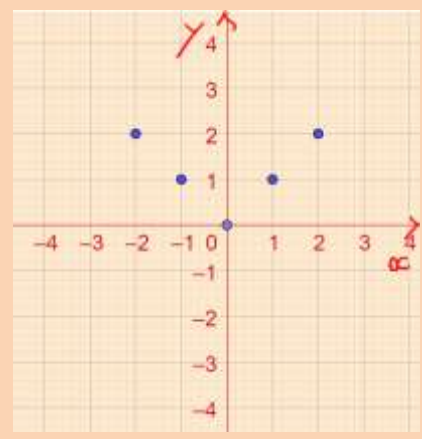
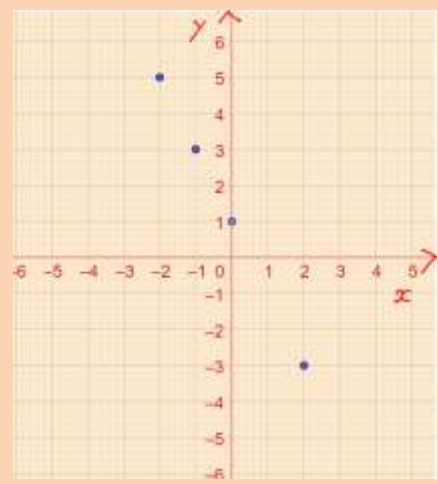
$\text{Im } f, GP$

x	-2	-1	0	2
f(x)	5	3	1	3

$$f(-2) = -2 \cdot (-2) + 1 = 4 + 1 = 5$$

x	-2	-1	0	1	2
g(x)	2	1	0	1	2

$$\text{Im } g = \{2, 1, 0\}$$



③ $f: A \rightarrow \{-3, 2, 0, 5\}$

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

$$A = ?$$

x	-1	$\frac{3}{2}$	$\frac{1}{2}$	3
f(x)	-3	2	0	5

$$f(x) = -3 \Rightarrow 2x - 1 = -3 \Rightarrow 2x = -3 + 1 \Rightarrow 2x = -2 \Rightarrow x = -\frac{2}{2} \Rightarrow x = -1$$

$$\begin{aligned} \text{analog} \Rightarrow 2x - 1 = 2 &\Rightarrow 2x = 3 \Rightarrow x = \frac{3}{2} \\ 2x - 1 = 0 &\Rightarrow 2x = 1 \Rightarrow x = \frac{1}{2} \\ 2x - 1 = 5 &\Rightarrow 2x = 6 \Rightarrow x = 3 \end{aligned}$$

④ $f: A \rightarrow \mathbb{R}$

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

$$A = \{x \in \mathbb{R} \mid |2x - 1| < 5\}$$

GP

$$\begin{aligned} |2x - 1| < 5 &\Leftrightarrow -5 < 2x - 1 < 5 \quad | +1 \Leftrightarrow \\ -5 + 1 < 2x - 1 + 1 < 5 + 1 &\Leftrightarrow -4 < 2x < 6 \quad |:2 \Leftrightarrow \\ -2 < x < 3 &\Rightarrow A = (-2; 3) \end{aligned}$$

$$\begin{aligned} \text{Table: } & \begin{array}{c|c|c|c|c} x & -1 & 0 & 1 & 1 \end{array} \\ f(x) & \begin{array}{c|c|c|c|c} -3 & -1 & 1 & 1 & 1 \end{array} \end{aligned} \quad f(-1) = 2 \cdot (-1) - 1 = -2 - 1 = -3$$



⑤ $g: A \rightarrow \mathbb{R}$

$g(x) = -x + 3$

$A = \{x \in \mathbb{R} \mid -2 \leq \frac{3x-1}{5} < 1\}$

Gg



$-2 \leq \frac{3x-1}{5} < 1 \mid \cdot 5 \Leftrightarrow -10 \leq 3x-1 < 5 \mid +1 \Leftrightarrow -9 \leq 3x < 6 \mid :3 \Rightarrow -3 \leq x < 2$

$A = [-3; 2)$ $g(x) \mid \begin{array}{c|c|c|c} x & -2 & 1 & 0 \\ \hline g(x) & 5 & 2 & 3 \end{array}$ $g(-2) = -(-2) + 3 = 5$

⑥ $h: A \rightarrow \mathbb{R}$

$h(x) = -x$

$A = \{x \in \mathbb{R} \mid |2x-1| > 5\}$

$Gh = ?$

$|2x-1| > 5 \Leftrightarrow \left. \begin{array}{l} 2x-1 < -5 \text{ ou } 2x-1 > 5 \\ 2x < -4 \mid :2 \quad 2x > 6 \mid :2 \\ x < -2 \quad x > 3 \end{array} \right\} \Rightarrow A = (-\infty, -2) \cup (3, +\infty)$

$\begin{array}{c|c|c|c} x & -7 & -6 & 6 & 7 \\ \hline h(x) & 7 & 6 & -6 & -7 \end{array}$ $h(-7) = -(-7) = 7$

⑦ $f: A \rightarrow \mathbb{R}$

$f(x) = x+1$

$A = \{x \in \mathbb{Z} \mid |1-2x+1| < 6\}$

Gf

$\left\{ \begin{array}{l} |1-2x+1| < 6 \Leftrightarrow -6 < -2x+1 < 6 \mid -1 \\ -7 < -2x < 5 \mid \cdot (-1) \Leftrightarrow 7 > 2x > -5 \Leftrightarrow \\ -5 < 2x < 7 \mid :2 \Rightarrow -\frac{5}{2} < x < \frac{7}{2} \\ -2\frac{1}{2} < x < 3\frac{1}{2} \end{array} \right\} \Rightarrow A = \{-2, -1, 0, 1, 2, 3\}$
 $x \in \mathbb{Z}$



$\begin{array}{c|c|c|c|c|c|c} x & 0 & 1 & 2 & -2 & -1 & 3 \\ \hline f(x) & 1 & 2 & 3 & -1 & 0 & 4 \end{array}$

$$h: A \rightarrow \mathbb{R}$$

$$h(x) = -x + 1$$

$$A = \{x \in \mathbb{N} \mid |3x - 5| > 4\}$$

$$A = \{0, 4, 5, 6, 7, \dots\}$$

$$G_h$$

x	0	4	5	6	7	...
h(x)	1	-3	-4	-5	-6	...



$$\textcircled{1} f: \mathbb{R} \rightarrow \mathbb{R} \quad f(x) = -3x + 4$$

$$P(m, 5) \in G_f \Rightarrow m = ?$$

$$P(m, 5) \in G_f \Leftrightarrow f(m) = 5 \Rightarrow -3m + 4 = 5 \Rightarrow -3m = 5 - 4 \Rightarrow -3m = 1 \Rightarrow m = -\frac{1}{3}$$

$$P(-\frac{1}{3}, 5) \in G_f \quad \text{Probau: } f(-\frac{1}{3}) = -3 \cdot (-\frac{1}{3}) + 4 = +1 + 4 = 5 \Rightarrow P(-\frac{1}{3}, 5) \in G_f$$

$$Q(1, n) \in G_f \Rightarrow n = ?$$

$$Q(1, n) \in G_f \Leftrightarrow f(1) = n \Rightarrow n = -3 \cdot 1 + 4 \Rightarrow n = -3 + 4 \Rightarrow n = 1$$

$$\text{Probau: } f(1) = -3 \cdot 1 + 4 = -3 + 4 = 1 \Rightarrow Q(1, 1) \in G_f$$

x	0	2
f(x)	4	-2

