

Functii - Aplicatii

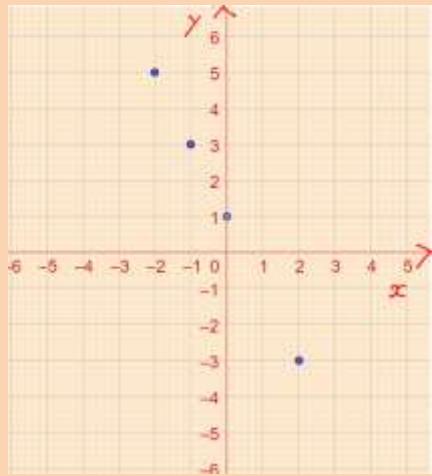
$$\text{① } f: \{-2, -1, 0, 2\} \rightarrow \mathbb{R}$$

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

a) $\text{Im } f$

b) GP

$$\left. \begin{array}{l} \text{Im } f = \{f(x) | x \in A\} \\ \begin{array}{c|ccccc} x & -2 & -1 & 0 & 2 \\ f(x) & 5 & 3 & 1 & -3 \end{array} \\ f(-2) = -2 \cdot (-2) + 1 = 4 + 1 = 5 \end{array} \right\}$$

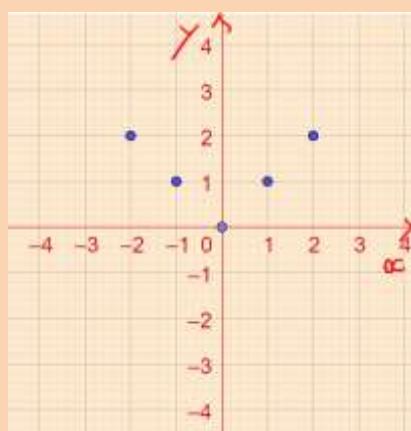


$$\text{② } g: \{-2, -1, 0, 1, 2\} \rightarrow \mathbb{R}$$

$$g(x) = |2x|$$

$\text{Im } f, \text{GP}$

$$\left. \begin{array}{l} \text{Im } g = \{2, 1, 0\} \\ \begin{array}{c|ccccc} x & -2 & -1 & 0 & 1 & 2 \\ g(x) & 2 & 1 & 0 & 1 & 2 \end{array} \end{array} \right\}$$



$$\text{③ } h: A \rightarrow \{-3, 2, 0, 5\}$$

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

$A = ?$

$$\left. \begin{array}{c|ccccc} x & -1 & \frac{3}{2} & \frac{1}{2} & 3 \\ h(x) & -3 & 2 & 0 & 5 \end{array} \right\}$$

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

analog $\Rightarrow 2x - 1 = 2 \Rightarrow 2x = 3 \Rightarrow x = \frac{3}{2}$

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

$$\left. \begin{array}{l} 2x - 1 < 5 \Leftrightarrow -5 < 2x - 1 < 5 \Leftrightarrow -5 + 1 < 2x - 1 + 1 < 5 + 1 \Leftrightarrow -4 < 2x < 6 \Leftrightarrow -2 < x < 3 \Rightarrow A = (-2; 3) \\ 2x = 6 \Rightarrow x = 3 \end{array} \right\}$$

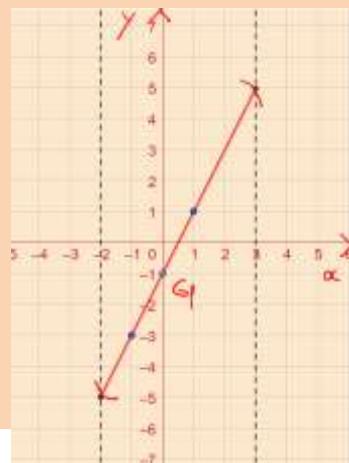
$$\text{④ } h: A \rightarrow \mathbb{R}$$

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

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

GP

$$\left. \begin{array}{l} |2x - 1| < 5 \Leftrightarrow -5 < 2x - 1 < 5 \Leftrightarrow -5 + 1 < 2x - 1 + 1 < 5 + 1 \Leftrightarrow -4 < 2x < 6 \Leftrightarrow -2 < x < 3 \Rightarrow A = (-2; 3) \\ \begin{array}{c|ccccc} x & -1 & 0 & 1 & & \\ h(x) & -3 & -1 & 1 & & \end{array} \quad h(-1) = 2 \cdot (-1) - 1 = -2 - 1 = -3 \end{array} \right\}$$



⑤ $g: A \rightarrow \mathbb{R}$

$$g(x) = -x + 3$$

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

Graf



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

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

⑥ $h: A \rightarrow \mathbb{R}$

$$h(x) = -x$$

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

Graf?

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

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

⑦ $f: A \rightarrow \mathbb{R}$

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

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

Graf

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

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



$$\begin{aligned}
 h: A \rightarrow \mathbb{R} \\
 h(x) = -x + 1 \\
 A = \left\{ \overbrace{x \in \mathbb{N}}^{x \geq 0} \mid |3x - 5| > 4 \right\} \\
 \left. \begin{array}{l} |3x - 5| > 4 \Leftrightarrow 3x - 5 < -4 \text{ oder } 3x - 5 > 4 \\ 3x < 1 \quad 3x > 9 \\ x < \frac{1}{3} \quad x > 3 \end{array} \right\} \\
 A = \{0, 4, 5, 6, 7, \dots\} \\
 G_h \\
 \xrightarrow{\quad} \begin{array}{c} x \\ \hline 0 & 4 & 5 & 6 & 7 & \dots \\ h(x) & 1 & -3 & -4 & -5 & -6 & \dots \end{array}
 \end{aligned}$$



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

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

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

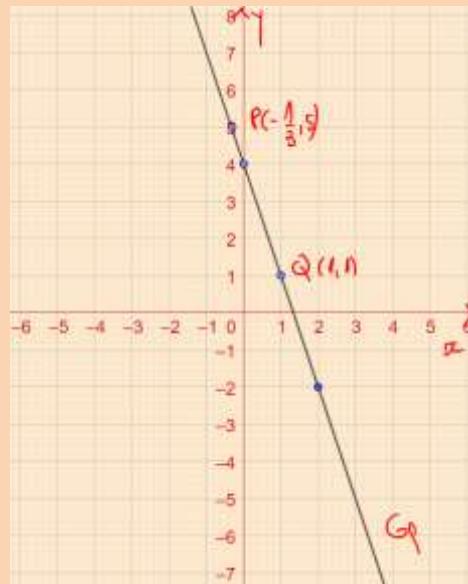
$P(-\frac{1}{3}, 5) \in G_f$ Prob: $f(-\frac{1}{3}) = -3 \cdot (-\frac{1}{3}) + 4 = 1 + 4 = 5 \Rightarrow P(-\frac{1}{3}, 5) \in G_f$

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

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

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

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



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