①

a) $y = x^2 + 1$ is a function for one input one output

b) $y^2 = x + 1$ is not a function

$y = \pm\sqrt{x+1}$

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② Which functions are surjective

1) $f: \mathbb{Z} \to \mathbb{Z}$ defined by

$f(n) = 3n$

f - is not surjective, because $\mathbb{Z}$ is int number, and n could be rational

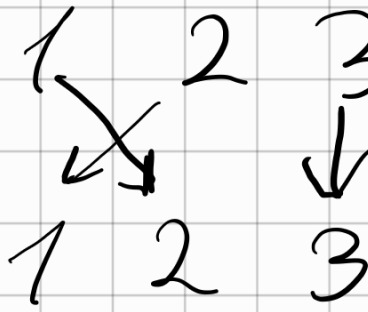
2) $g: \{1,2,3\} \to \{a,b,c\}$

defined by $g = \begin{pmatrix} 1 & 2 & 3 \\ c & a & a \end{pmatrix}$

g - is not surjective

"b" is missing

3) $h: \{1,2,3\} \to \{1,2,3\}$



; h - is surjective, because for each output there is at least one input.

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(3) Which of them are injective

f and h are injective

If $f(x) = \frac{1}{x+2}$ and $g(x) = \frac{1}{x} - 2$

is $g = f^{-1}$? $f(x) \frac{1}{x-2}$

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

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

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

$f^{-1}(y) = \frac{1}{y} - 2 \Rightarrow g = f^{-1}$

(4) Find the inverse of the function

$f(x) = 2 + \sqrt{x-4}$

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

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

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

$y-4 = (x-2)^2$

$y = (x-2)^2 + 4$; $f^{-1}(x) = (x-2)^2 + 4$

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(5) $C = \frac{5}{9}(F-32)$

$\frac{9}{5}C = F-32$

$F = \frac{9}{5}C + 32$

(6) Find the domain and range

$g(x) = 2\sqrt{x-4}$

$x - 4 \geq 0$

$x \geq 4$

Domain $x \in [4; +\infty)$

Range $g(x) \in [0; +\infty)$

(7) $h(x) = -2x^2 + 4x - 9$

$x = -\frac{4}{2(-2)} = 1$

$h(1) = -2 + 4 - 9 = -7$

Domain $x \in (-\infty; +\infty)$

Range $h(x) \in (-\infty; -7]$

(8) $f(x) = \frac{x-4}{x^2 - 2x - 15}$

$x^2 - 2x - 15 = 0$; $D = b^2 - 4ac$

$D = 4 - 4(-15) = 64$

$\sqrt{64} = \pm 8$

$$x_1 = \frac{2+8}{2} = 5$$

$$x_{1,2} = \frac{-b \pm \sqrt{D}}{2a}$$

$$x_2 = \frac{2-8}{2} = -3$$

Domain $x \in (-\infty; -3) \cup (-3; 5) \cup (5; +\infty)$