1) Determine if each of the following equations are functions:

$y=x^2+1$ let's assume $x=4$. So then,

$y=4^2+1$

$y=16+1$ So there is only one solution

$y=17$. for y and it is $y=17$.

2) $y^2=x+1$. let's assume that $x=15$.

$y^2=15+1$ Here we can observe equation

$y^2=16$ that cannot be a function, because

$y=\sqrt{16}$ it's illegal and one input here

$y=4$ or $y=-4$ able to produce two outputs.

3) $f: \mathbb{Z} \to \mathbb{Z}$ defined by $f(n)=3n$.

1) One input gives only one result (output).

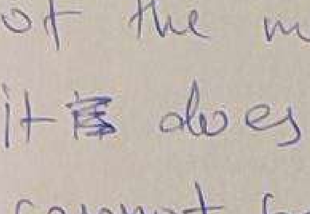
~~[illegible] injective, more than surjective~~.

It is not surjective function.

For example, if we assume $x=3$, $n \in \mathbb{Z}$, we will receive $f(n)=9$. But there is no another input to get same output. to receive $f(n)=10$, we cannot use integer $n \in \mathbb{Z}$. This contradicts the definition of surjective function.

2) $g:\{1,2,3\} \rightarrow \{a,b,c\}$ defined by $g = \begin{pmatrix} 1 & 2 & 3 \\ c & a & a \end{pmatrix}$
according to the task, $x \in \{1,2,3\}$, so this domain includes input of three integers $\mathbb{Z}$. as we see, ~~the matrix where~~ the bottom of the matrix is conneted with input, but it does not include „b". So this function cannot be surjective.

3) $g:\{1,2,3\} \rightarrow \{1,2,3\}$ defined as follows:



in this equation every input posseses it own attribute. at the bottom of the matrix, The number of attributs is equal to input. An nothing between input and bottom of matrix is missed.

1) $f: \mathbb{Z} \rightarrow \mathbb{Z}$. defined by $f(n) = 3n$.
let's assume that x or $n=3$, $f(n)=9$.
The same result cannot be receved by sereral (even two) inputs. If $n \neq 0$, so the function is injective. One single integer can give one single result. It seem that on the graph the function can cross the horisontal line Just once.

2) $g : \{1, 2, 3\} \to \{a, b, c\}$ defined by $g = \begin{pmatrix} 1 & 2 & 3 \\ c & a & a \end{pmatrix}$.
in this function input $\{1, 2, 3\}$. is set to the codomain $\{a, b, c\}$. But nothing is set to „b".
So it is not surjective function. $g(x) = b$ is not in the range of the matrix.

3) $h : \{1, 2, 3\} \to \{1, 2, 3\}$ defined as follows, $\boxed{\begin{matrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{matrix}}$
In this function all inputs fall on attributes.
So this function is injective.

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

$g(x) = \frac{1}{\frac{1}{x+2}} - 2 = x + 2 - 2 = x$. from this side we can say Yes.

Let's see from the output of $g(x)$ and $f(x)$ expression:

$f(g(x)) = \frac{1}{\frac{1}{x} - 2 + 2} = \frac{1}{\frac{1}{x}} = x$. So same answer. Yes

2) Find the inverse of the function.

$f(x) = 2 + \sqrt{x-4}$ Let us change $f(x)$ to y.

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

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

So the domain of function f is $[4, \infty)$. the range of f is $[2, \infty)$. So this means that the domain of the inverse function f^{-1} is also $[2, \infty)$.

1) Find a formula for the inverse function that gives Farenheit temperature as a function of Celsiers temp-re.

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

So now we have inversed function.

so

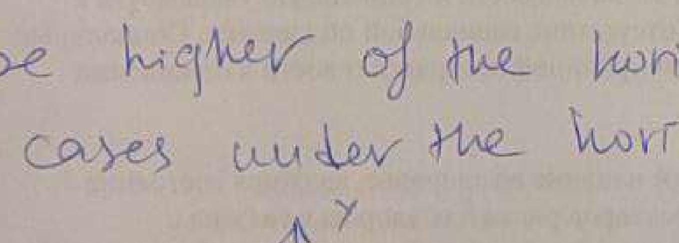
$$F = h^{-1}(C) = \frac{9}{5}C + 32$$

2) $2x^4 > 3x^3 + 9x^2$ to simplify our task let's equate our equation to zero „0".

$2x^4 - 3x^3 - 9x^2 > 0$

$x^2(2x^2 - 3x - 9) > 0$ So if we see the graph

$x^2(2x+3)(x-3) > 0$. the line of the equation will be higher of the horizontal line, and in some cases under the horizontal line.



$x \in \{0, -\frac{3}{2}; 3\}$

$(-\infty; -\frac{3}{2})$