

23rd May
2024.

MTH230 - Linear Algebra

Study ^{PS} 41-50

Inverse Function

The inverse function of m is simply a rule that _____ the rule of m . (In the same way that 'addition and subtraction', 'multiplication and division' are inverse of each other)

Consequently the range and domain of f and f^{-1} .

Find the inverse of $f(x) = \frac{x}{x+1}$

$$y = \frac{x}{x+1}$$

$$y(x+1) = x$$

$$yx + y = x \quad \dots \quad *$$

$$yx - x = -y$$

$$x(y-1) = -y$$

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

$$f^{-1} = \frac{-x}{x-1}$$

Solve $f(x) = \frac{4x-3}{2-x}$

$$y = \frac{4x-3}{2-x}$$

$$2y - xy = 4x - 3$$

$$-xy - 4x = -2y - 3$$

$$x(-y-4) = -2y-3$$

$$x = \frac{2y+3}{y+4}$$

Domain:

The domain of a function $f(x)$ is the complete set of all possible values of the independent variable.

It simply means a set of all possible x values which will make the function work.

Codomain:

The codomain of a function is the complete set of all possible resulting value of the dependent variable after we have substituted the domain.

Codomain = Range if All values in Domain map to Codomain.
 $\text{Range} \subseteq \text{Codomain}$.

Range: The range of a function is the set of picture of its domain. In other words, we can say it is a subset of its codomain.

$$y = x^2 - 81 \rightarrow \text{domain} = \text{Real numbers.}$$

$$y + 81 = x^2$$

$$x = \sqrt{y + 81} \rightarrow \text{Codomain} = y \geq -81$$

$$y^2 - 36 = x^2$$

$$\boxed{y \geq -36}$$

$$x = \sqrt{y^2 - 36}$$

$$\downarrow$$

$$\begin{cases} y \geq 6 \\ y \leq -6 \end{cases}$$

Mapping

Mapping is a relation because it is another prescribed way of assigning to each object in one set to a particular object in another set. A mapping is also called function, transformation, operator. Every mapping is a relation, but every relation may not be a mapping.

Find out if R is a mapping from $A \rightarrow B$

$$A = \{3, 4, 5\} \quad B = \{6, 7, 8, 9\}$$

$$R = \{(3, 6), (4, 7), (5, 8)\} \quad \checkmark$$

Functions need
closure

$$R = \{(3, 6), (3, 7), (5, 8)\} \quad \times$$

A value in the domain cannot map to more than one value in the 'codomain' (in a mapping)

A value in the codomain can have more than one values in the domain.

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Types of Mappings.

Bijective

1 One-to-One \div Only one element in the domain can have one value in the codomain

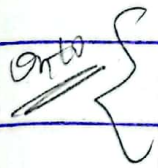
2 Onto Mapping \cdot $y = x^2$ More than one element in the domain can map one element in the co-domain

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Surjective, Injective and Bijective Mapping.

Surjective:



A mapping L such that $A \rightarrow B$ is a surjective function, for every element in B , there is at least one element in A .

Injective:

A mapping L such that $A \rightarrow B$ is an injective function.

Go to Page 60, Answer Question 1-7, solve inside your note.