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Functions Defined on General Sets

Notes

- A function f from a set X to a set Y, denoted $f : X \to Y$, is a relation from X, the domain, to Y, the co-domain, that satisfies two properties:

    1. every element in X is related to some element in Y, and
    2. no element in X is related to more than one element in Y.

- image of X under $f = y \in Y | y = f(x), for some x in X$

- the inverse image of $y = x \in X | f(x) = y$

- Definition Logarithms and Logarithmic Functions
  Let b be a positive real number with $b \neq 1$. For each positive real number x, the logarithm with base b of x, written $\log_b x$, is the exponent to which b must be raised to obtain x.

$$log_b x = y \Leftrightarrow b^y = x.$$

  The logarithmic function with base b is the function from $\mathbf{R}^+$ to $\mathbf{R}$ that takes each positive real number x to $\log_b x$.

Test Yourself

1. the value of f at X

2. the output of f for the input x; the value of f at x; the image of x under f

3. the set of all y in Y such that y = f(x), where x is some element of X.

4. preimage of y; inverse image of y

5. $x \in X | f(x) = y$; inverse image of y

6. F(x) = G(x) for all x in set X