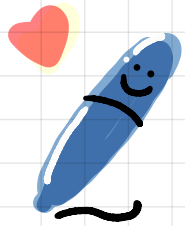
3.4) Functions



Functions

Example: $f(x) = x^2 + 3$ $[f: x \to x^2 + 3]$

$g(x) = 2x - 1$

1) $f(-5)$

2) $g(3)$

3) $f(m)$

Functions

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

4) Find A when $f(A) = 7$

5) $f(2x)$

6) $g(2x+3)$

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

7) $f(x+1)$

8) $g(2x^2 - 1)$

Composite Function

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

9) $fg(3)$

10) $gf(1)$

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

11) $fg(x)$

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

12) $gf(x)$

13) $gg(x)$

Inverse Function

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

14) find inverse function of f(x)

$f(x) = x^2 + 3$

$g(x) = 2x - 1$

15) Find $g^{-1}(x)$

Extra : Inverse Function

Example: 1) find inverse function of $h(x)$; $h(x) = \sqrt{2x+1}$

2) find inverse function of $f(x)$; $f(x) = \frac{3}{2x-1}$

3) find inverse function of $g(x)$; $g(x) = \frac{2x+3}{x}$

4) Find inverse function of $f(x)$; $f(x) = \frac{\sqrt{2x+1}}{3}$

Inverse Function by Completing the Square

5) find inverse function of $f(x)$; $f(x) = x^2 + 6x$

6) Find inverse function of $h(x)$; $h(x) = x^2 - 4x + 5$

Functions

***Composite function

$fg(x) = f \circ g(x)$

$gf(x) = g \circ f(x)$

$fg(x) \neq f(x)g(x)$

Functions

Domain and Range of Function

Domain → Values of x

Range → Values of y

$x \geq 0$ (Domain more than or equal 0)

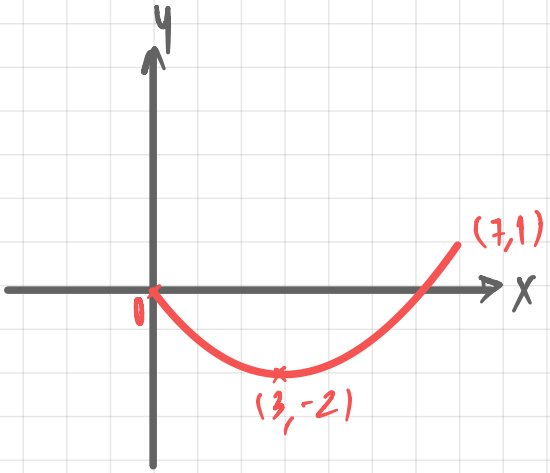
$x \in R$ (Domain is element in real number)

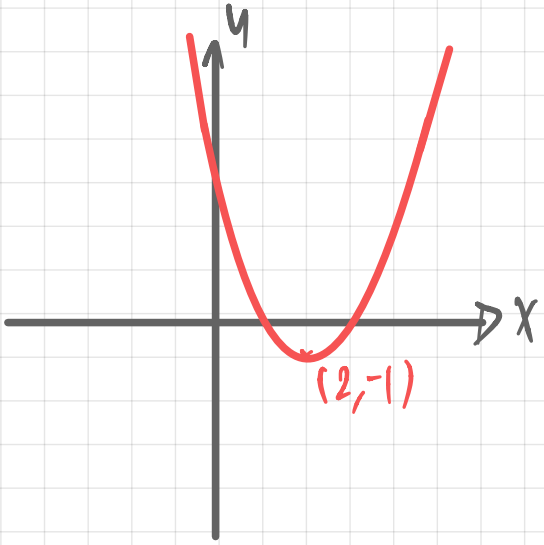
$x \in N$ (Domain is natural number)

$x \neq 2$ (Domain less than 2 or more than 2)

Functions

Example:





Functions

Which value(s) of x cannot be included in the domain.

Which value(s) of x must be excluded from the domain.

Which value(s) of x for function is undefined

$$f(x) = \frac{\triangle}{\square} \rightsquigarrow \square = 0$$

$$f(x) = \sqrt{\square} \rightsquigarrow \square < 0$$

Functions

Example: Which value(s) of x for function is undefined.

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

2) $f(x) = \frac{3}{2x+1}$

3) $g(x) = \sqrt{2x+1}$

4) $f(x) = \frac{3x+1}{x}$

5) $g(x) = 5 + \sqrt{x-3}$

6) $h(x) = \frac{x-3}{x-5}$

Functions.

Extra:

Domain ⟶ x

Range ⟶ y

$f(x) = 3x + 1$

$f(A) = 18 \longrightarrow$

$f(2) = B \longrightarrow$

Functions.

Inverse Function

$$f(x) = 3x + 1$$

Range of f(x) $\longrightarrow$ Domain of $f^{-1}(x)$

Domain of f(x) $\longrightarrow$ Range of $f^{-1}(x)$

Functions.

$f(x) = 3x+1$ $\longleftrightarrow$ $f^{-1}(x) = \frac{x-1}{3}$

Functions.

Example: $f(x) = 5^x$

Find value of x when $f^{-1}(x) = 2$

Example: $h(x) = 2^{x+1}$

Find value of $h^{-1}(32)$

Functions.

Example: $g(x) = x^2 - 6x + 5$ with domain $\{x : x \square 3\}$

Find inverse function of $g(x)$.

Functions.

Function of Inverse Function

$$f(x) = 3x+1 \longrightarrow f^{-1}(x) = \frac{x-1}{3}$$

Functions.

Example: $f(x) = 3x + 1$ and $gf(x) = x$. Find value of $g(x)$.

$f(x) = 3x+1 \quad \longleftrightarrow \quad f^{-1}(x) = \frac{x-1}{3}$

Functions.

Example:

1) $h^{-1}h(x)$

2) $hh^{-1}(x^2-1)$

3) $g^{-1}g(5x-2)$

4) $ff^{-1}\left(\frac{5x-3}{2}\right)$