

Function Notation

March 19th

Functions can be expressed as equations. For example:

$$y = 3|x-2|+7 \quad y = \frac{1}{x-4} + 5 \quad y = 2x^2 - 4 \quad y = -\frac{1}{2}\sqrt{x+3} - 4 \quad y = 3x^3 - 5$$

$$y = |x| \quad y = \frac{1}{x} \quad y = x^2 \quad y = \sqrt{x} \quad y = x^3$$

We can use function notation to express these exact same functions:

$$\begin{matrix} y \\ \textcircled{f(x)} \end{matrix} = 3|x-2|+7 \quad \begin{matrix} y \\ \textcircled{f(x)} \end{matrix} = \frac{1}{x-4} + 5 \quad \begin{matrix} y \\ \textcircled{f(x)} \end{matrix} = -\frac{1}{2}\sqrt{x+3} - 4 \quad \dots$$

↑
"fat x"

Function notation is very handy for finding ordered pairs.

Ex) $y = 3x^2 - 2$ Sub in $x = -5$ into equation

$$y = 3(-5)^2 - 2$$

$$y = 3(25) - 2 \quad \therefore (-5, 73) \text{ is on the function.}$$

$$y = 75 - 2$$

$$y = 73$$

Find $f(-5)$

$$f(x) = 3x^2 - 2 \quad \therefore (-5, 73) \text{ is on the function.}$$

$$\begin{aligned} f(-5) &= 3(-5)^2 - 2 \\ &= 3(25) - 2 \\ &= 75 - 2 \\ &= 73 \end{aligned}$$

Ex) 1a) $f(x) = 2x^2 - 4$

$$f(-3) = 2(-3)^2 - 4$$

$$f(-3) = 18 - 4$$

$$f(-3) = 14$$

$\therefore (-3, 14)$ is
on the function.

b) $h(x) = -x - 1$

$$h(-7) = -(-7) - 1$$

$$h(-7) = 7 - 1$$

$$h(-7) = 6$$

$\therefore (-7, 6)$ is on
the function.

c) $g(x) = \frac{1}{x+2}$

$$g\left(\frac{1}{2}\right) = \frac{1}{\frac{1}{2}+2}$$

$$g\left(\frac{1}{2}\right) = \frac{2}{5}$$

$\therefore \left(\frac{1}{2}, \frac{2}{5}\right)$ is on the
function.

Ex 2 a) $f(2x) = 2(2x)^2 - 4$
 $f(2x) = 2(4x^2) - 4$
 $f(2x) = 8x^2 - 4$

b) $h(-x+5) = -(-x+5) - 1$
 $= x - 5 - 1$
 $= x - 6$

c) $g(\ln(x)) = \frac{1}{(\ln(x)) + 2}$
 $= \frac{1}{(-x-1) + 2}$
 $= \frac{1}{-x+1}$
 $= \frac{-1}{x-1}$

Ex 3 a) $f(x-3) = 2(x-3)^2 - 4$
 $= 2(x-3)(x-3) - 4$
 $= 2(x^2 - 6x + 9) - 4$
 $= 2x^2 - 12x + 18 - 4$
 $= 2x^2 - 12x + 14$

b) $h(f(x)) = -(2x^2 - 4) - 1$
 $= -2x^2 + 4 - 1$
 $= -2x^2 + 3$

c) $f(-5) = 2(-5)^2 - 4$
 $= 2(25) - 4$
 $= 50 - 4$
 $= 46$

$g(f(-5)) = \frac{1}{46}$