

1.3 Function Notation

We now use $f(x)$ instead of y

Read "f at x" or "f of x"

i.e. $y = 2x+1$ is $f(x) = 2x+1$

this notation is useful for such things as describing height as a function of time $h(t)$

Ex 1: Connecting the height of a ball above the ground with time:

A ball was dropped from a height of 200m and it's height above the ground is represented by the following function:

$$h(t) = -5t^2 + 3t + 200$$

How would you find the height of the ball at any time?

➔ Sub in values for t and solve for h

Note "t" is time so do not sub in neg. values
Domain should make sense to the question

$$h(0) = -5(0)^2 + 3(0) + 200$$

$$= 200$$

$$h(1) = -5(1)^2 + 3(1) + 200$$

$$= 198$$

$$h(2) = -5(2)^2 + 3(2) + 200$$

$$= 186$$

Shows what was subed in for time

t	h
0	200
1	198
2	186
⋮	⋮

Ex 2: If $f(x) = 2(x - 1)^2 + 3$, find:

$$\begin{aligned} \text{a) } f(0) &= 2(0-1)^2 + 3 \\ &= 2(-1)^2 + 3 \\ &= 2 + 3 \\ &= 5 \end{aligned}$$

this represents the point $(0, 5)$

$$\text{c) } f(4) - f(1) \quad \leftarrow \text{Subtract "y" values}$$

Evaluate separately then subtract

$$\begin{aligned} f(4) &= 2(4-1)^2 + 3 \\ &= 2(3)^2 + 3 \\ &= 2(9) + 3 \\ &= 21 \end{aligned}$$

$$\begin{aligned} f(1) &= 2(1-1)^2 + 3 \\ &= 2(0)^2 + 3 \\ &= 3 \end{aligned}$$

then

$$\begin{aligned} f(4) - f(1) &= 21 - 3 \\ &= 18 \end{aligned}$$

$$\begin{aligned} \text{b) } f\left(\frac{1}{2}\right) &= 2\left(\frac{1}{2}-1\right)^2 + 3 \\ &= 2\left(-\frac{1}{2}\right)^2 + 3 \\ &= 2\left(\frac{1}{4}\right) + 3 \\ &= 3\frac{1}{2} \end{aligned}$$

$$\text{d) } f(4-1) \quad \leftarrow \text{Subtract x values}$$

$$\begin{aligned} f(4-1) &= f(3) \\ &= 2(3-1)^2 + 3 \\ &= 2(2)^2 + 3 \\ &= 11 \end{aligned}$$

Ex 2 continued: If $f(x) = 2(x - 1)^2 + 3$, find:

e) $f(3m)$

$$\begin{aligned}
 &= 2(3m-1)^2 + 3 && \text{Sub in} \\
 &= 2(3m-1)(3m-1) + 3 && \text{Simplify} \\
 &= 2(9m^2 - 3m - 3m + 1) + 3 \\
 &= 2(9m^2 - 6m + 1) + 3 \\
 &= 18m^2 - 12m + 2 + 3 \\
 &= 18m^2 - 12m + 5
 \end{aligned}$$

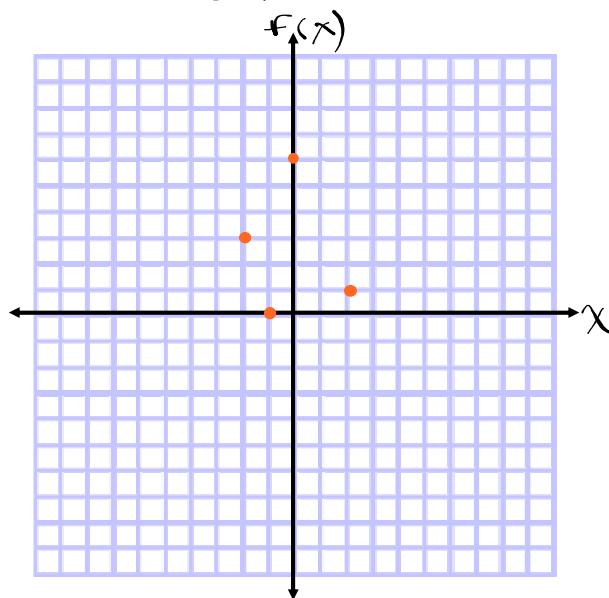
f) $f(4x)$

$$\begin{aligned}
 &= 2(4x-1)^2 + 3 \\
 &= 2(4x-1)(4x-1) + 3 \\
 &= 2(16x^2 - 8x + 1) + 3 \\
 &= 32x^2 - 16x + 2 + 3 \\
 &= 32x^2 - 16x + 5
 \end{aligned}$$

g) $f(x+5)$

$$\begin{aligned}
 &= 2((x+5)-1)^2 + 3 \\
 &= 2(x+4)^2 + 3 \\
 &= 2(x^2 + 8x + 16) + 3 \\
 &= 2x^2 + 16x + 35
 \end{aligned}$$

Ex 3 Given the graph of f evaluate:



FROM THE POINT
(-2, 3) ←

$$f(-2) = \underline{3}$$

$$f(-1) = \underline{0}$$

$$f(0) = \underline{6}$$

$$f(7) = \underline{DNE}$$

Given $f(x) = 1$ find x

$$x = \underline{2}$$

When $y=1$
what is x

Hmwk :

P. 32 # 1, 5 ad, 6 abc, 10a (i,vi), 11- 13