

### 3.0 FUNCTIONS REVIEW AND NOTATION

Note Title

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For  $f(x) = 3x^2 - 5$ , find

$$\begin{aligned} \text{a) } f(-2) &= 3(-2)^2 - 5 \\ &= 12 - 5 \\ &= 7 \end{aligned}$$

$$\begin{aligned} \text{b) } x \text{ such that } f(x) &= 22 \\ 22 &= 3x^2 - 5 \\ 27 &= 3x^2 \\ 9 &= x^2 \\ x &= \pm 3 \end{aligned}$$

So  $f(-2) = 7$  is the same as  $(-2, 7)$

What are the similarities and differences?  
 $y = 3(x+1)^2 - 2$ ,  $y = 3\sqrt{x+1} - 2$ ,  $y = 3\sin(x+1) - 2$

We look at the general function

$$y = 3\underset{\uparrow}{f}(x+1) - 2$$

any unknown function

$$\begin{aligned} \text{Is } 3(x+1)^2 - 2 &= 3x^2 - 3(1)^2 - 2 \quad \times \\ &= 3^2(x+1) - 2 \quad \times \end{aligned}$$

Can't change the order or bring anything into or out of  $f(x)$  ...  $f(2x) \neq 2f(x)$

Replacement Notation:

How does  $y = (x-2)^2 + 1$  relate to  $y = x^2$ ?

write as  $\underset{\text{compared to}}{\underset{\text{y}}{\text{y-1}}} = \underset{\text{y}}{\underset{\text{y}}{\text{(x-2)}}}^2$

So  $y \rightarrow y-1$  and  $x \rightarrow x-2$

For  $f(x) = 2x^2 - x + 1$ , write the (simplified) equation after each

a)  $y = -f(x+1)$

$$\begin{aligned} y &= -[2(x+1)^2 - (x+1) + 1] \\ &= -[2x^2 + 4x + 2 - x - 1 + 1] \\ &= -2x^2 - 3x - 2 \end{aligned}$$

b)  $x \rightarrow -x$

$$y \rightarrow y+2$$

$$y = 2x^2 - x + 1$$

$$y+2 = 2(-x)^2 - (-x) + 1$$

$$y = 2(-x)^2 - (-x) - 1$$

$$y = 2x^2 + x - 1$$

$$(-x)^2 = x^2$$

$$(-x)^3 = -x^3$$