

## Function Terminology and Notation

(1) Let  $f(x) = \frac{1}{x} + x^2$ .

(a) What is  $f(4)$ ?  $f(4) = \frac{1}{(4)} + (4)^2 = \frac{1}{4} + 16 \cdot \frac{4}{4} = \frac{1}{4} + \frac{64}{4} = \frac{65}{4}$

(b) What is  $f(-1)$ ?  $f(-1) = \frac{1}{(-1)} + (-1)^2 = \frac{1}{-1} + 1 = -1 + 1 = 0$

(c) What is  $f(\frac{1}{x})$ ? (Simplify as much as possible)

$$f\left(\frac{1}{x}\right) = \frac{1}{\left(\frac{1}{x}\right)} + \left(\frac{1}{x}\right)^2 = \frac{x^2 \cdot x}{x^2} + \frac{1}{x^2} = \frac{x^3}{x^2} + \frac{1}{x^2} = \frac{x^3 + 1}{x^2}$$

(2) Let  $R(t) = 4t - t^2$ . What is  $R(x - 5)$ ? Simplify your answer.

$$\begin{aligned} R(x-5) &= 4 \cdot (x-5) - (x-5)^2 = 4x - 20 - (x^2 - 10x + 25) \\ &= 4x - 20 - x^2 + 10x - 25 \\ &= 14x - x^2 - 45 \end{aligned}$$

(3) Let  $Q(z) = x + 2z$ .

(a) What is  $Q$  a function of? of  $z$

(b) What is  $Q(3)$ ?  $Q(3) = x + 2 \cdot (3) = x + 6$

(c) What is  $Q(a)$ ?  $Q(a) = x + 2 \cdot (a) = x + 2a$

(4) If  $f$  is a function, then which is impossible?

(a)  $f(2) = 4$  and  $f(8) = 4$ .

(b)  $f(4) = 2$  and  $f(4) = 8$ .

one input cannot  
have two outputs

- (5) If the point  $(3, 5)$  is on the graph of a function, what does that mean?

we graph  $(x, f(x))$

So ~~5~~  $5 = f(3)$

so  $f(3) = 5$

- (6) If the value 7 is in the domain of a function, what does that mean in terms of its graph?

there is a point above/below 7 plotted on the graph of  $f(x)$ .

OR the line  $x=7$  hits the graph once

- (7) If the value 7 is in the range of a function, what does that mean in terms of its graph?

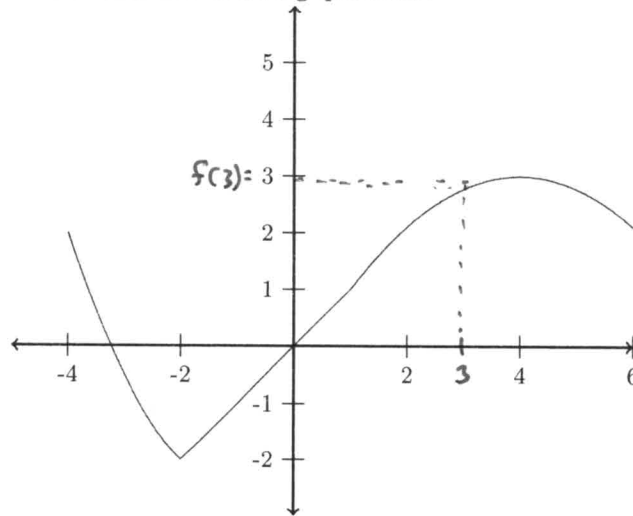
~~there is a point with y-value = 7~~

there is a point with  $y$ -value = 7

OR

the line  $y=7$  hits the graph at least once

- (8) Use the graph of  $f$  below to answer the following questions.



- (a) What is  $f(3)$ ? (approximately)

$f(3) = 3$

- (b) What is the domain of the function?

$[-4, 6]$

domain = inputs

- (c) What is the range of the function?

$[-2, 3]$

range = outputs