

1. The graph of a function  $f$  is shown below. Find the following:

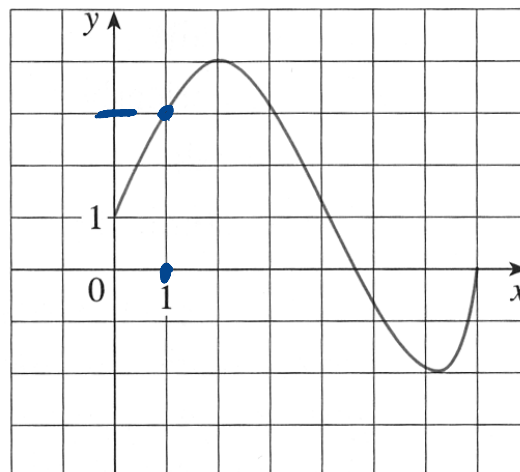
a)  $f(1)$  and  $f(5)$   $3, -0.6$

b) the domain of  $f$   
 $[0, 7]$

c) the range of  $f$   
 $[-2, 4]$

d) For which values of  $x$  is  $f(x) = 4$ ?  
 $x = 2$

e) Where is  $f$  increasing?  
 $[0, 2] \cup [6.2, 7]$



2. Let  $f(x) = 3x^2 - x + 2$ . Find and simplify the following expressions.

(a)  $f(2)$   $3 \cdot 2^2 - 2 + 2 = 12$

(b)  $f(a^2)$   $3 \cdot (a^2)^2 - a^2 + 2 = 3a^4 - a^2 + 2$

(c)  $[f(a)]^2$   $(3a^2 - a + 2)^2 = 9a^4 + \dots + 4$

(d)  $\frac{f(a+h) - f(a)}{h}$   $\leftarrow$  simple!  $\leftarrow$  expanded

$$\begin{aligned} & \frac{3(a+h)^2 - (a+h) + 2 - (3a^2 - a + 2)}{h} = \\ & = \frac{3a^2 + 6ah + 3h^2 - a - h + 2 - (3a^2 - a + 2)}{h} \\ & = \boxed{[6a - 1] + 3h} \end{aligned}$$

3. Find the domain of each of the following functions. Use interval notation.

1.  $f(x) = \frac{1}{x^4 - 16}$

$$x \neq \pm 2$$

$$(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$$

2.  $g(x) = \ln(x - 4)$

$$x - 4 > 0$$

$$x > 4$$

$$(4, \infty)$$

4. Graph each of the following piecewise defined functions.

a)  $f(x) = \begin{cases} -1 & \text{if } x \geq 2 \\ 7 - 2x & \text{if } x < 2 \end{cases}$

