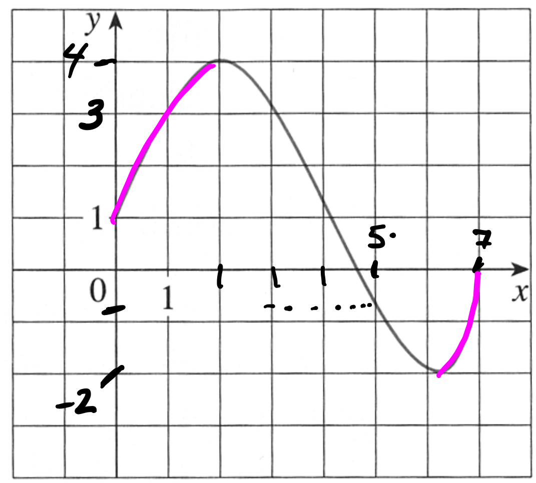
1. The graph of a function f is shown below. Find the following:



a) $f(1)$ and $f(5)$

$f(1)=3, \quad f(5)=-0.8$

b) the domain of f

$[0,7]$

c) the range of f

$[-2,4]$

what if this is 1?

$x=0$ and ≈ 4.2

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

$x=2$

e) Where if f increasing? $[0,2) \cup (6.1,7]$

2. Let $f(x) = 3x^2 - x + 2$. Find and simplify the following expressions. Are (b) and (c) different?

(a) $f(2)$

$f(2) = 3 \cdot 4 - 2 + 2 = 12$

(b) $f(a^2)$

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

(c) $[f(a)]^2 = (3a^2 - a + 2)^2$

$= 9a^4 - 6a^3 + 12a^2 - 3a + 2$

(d) $\dfrac{f(a+h) - f(a)}{h}$

$$= \frac{[3(a+h)^2 - (a+h) + 2] - [3a^2 - a + 2]}{h}$$

$$= \frac{3a^2 + 6ah + 3h^2 - a - h + 2 - 3a^2 + a - 2}{h}$$

$$= \frac{6ah + 3h^2 - h}{h} = 6a + 3h - 1$$

3. Write a formula for the top half of the circle with center $(2, 0)$ and radius 3.

circle:

$(x-2)^2 + y^2 = 9$

top half:

$y = \sqrt{9 - (x-2)^2}$

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

(a) $f(x) = \frac{1}{x^2 - 16}$ $= \frac{1}{(x+4)(x-4)}$

$x^2 - 16 = (x+4)(x-4)$

Ans: $(-\infty,-4) \cup (-4,4) \cup (4,\infty)$

keep $x = \pm 4$ out.

(b) $f(x) = \sqrt{x} + \sqrt{11 - x}$

ans: $[0, 11]$

Need $x \geq 0$ and $11 - x \geq 0$

OR

Need $x \geq 0$ and $x \leq 11$.

(c) $g(x) = \ln(x - 4)$

ans: $(4, \infty)$

Need $x - 4 > 0$

$x > 0$

(d) $h(x) = \frac{1}{\sqrt{x^2 - 5x - 6}}$ $= \frac{1}{\sqrt{(x-6)(x+1)}}$

ans: $(-\infty, -1) \cup (6, \infty)$

$x^2 - 5x - 6 = (x-6)(x+1)$

need $(x-6)(x+1) > 0$

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-2 -1 0 6 7

5. Graph each of the following piecewise defined functions.

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

b) $f(x) = \begin{cases} x + 1 & \text{if } x \leq -1 \\ x^2 & \text{if } x > -1 \end{cases}$