

Quiz 1 Review Functions, Domain, Range, and Average Rates of Change

Directions: Answer the following questions. Show and/or explain all work.

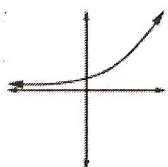
1. State whether the following are functions or nonfunctions. If it is a nonfunction, state why.

a.

X	-3	0	1	2	3	2	-1	-4	-6
y	10	3	8	10	15	10	9	12	5

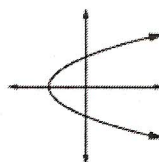
Yes

b.



Yes

c.



NO → VLT
shows some x's
have 2 y's

d.

X	10	12	14	10	9	12	13	8	6
y	3	3	4	8	2	8	3	2	9



No, for example $x=10$ has 2 different y-values.

2. State the **theoretical** domain and range of each of the functions below.

a. $f(x) = 2x - 9$

D: all reals

R: all reals

b. $f(x) = \sqrt{2x}$

D:

R:

c. $f(x) = -\frac{4}{x}$

D: $x \neq 0$

R: $y \neq 0$

d. $f(x) = x^2 - 9$

D: all reals

R: $y \geq -9$

e. $f(x) = \sqrt[3]{x}$

D: all reals

R: all reals

f. $f(x) = \frac{x}{2}$ Line!!

D: all reals

R: all reals

3. The intensity (in watts) of a light source is a function of its distance (in feet) from an object as defined by $I(d) = \frac{100}{d^2}$.

a. Which variable represents the input? d

Which variable represents the outputs? I or I(d)

b. Find the intensity for the given distance:

$I(10) = \underline{1}$

$I(4) = \underline{6.25}$

$I(0) = \underline{\text{no solution}}$

$I(12) = \underline{0.69} \text{ or } \frac{25}{36}$

Show your work over here:

Example: $I(10)$

$$I(10) = \frac{100}{(10)^2}$$

$$= \frac{100}{100}$$

$$= 1$$

c. Find the distance(s) that produce the given intensity:

$I(d) = 4, d = \underline{5, -5}$ $4d^2 = 100$

$d^2 = 25$

$I(d) = -2, d = \underline{\text{no solution}}$

$I(d) = 0, d = \underline{\text{no solution}}$

$I(d) = 25, d = \underline{2, -2}$ $25d^2 = 100$

$d^2 = 4$

Show your work over here:

Example: $I(d) = 4$

$$4 = \frac{100}{d^2}$$

$$d^2 \cdot 4 = \frac{100}{d^2} \cdot d^2$$

$$4d^2 = 100$$

$$\frac{4d^2}{4} = \frac{100}{4}$$

$$d^2 = 25 \rightarrow d = \sqrt{25} = 5, -5$$

d. Write a sentence explaining $I(5) = 4$ in the context of the problem.

When distance away from the object is 5 ft,
light intensity is 4 watts.

e. Refer back to your solutions to part c. Do all of your solutions make sense in the context of this problem? Explain your reasoning.

No, can't have negative distances

f. Describe the theoretical domain & ranges of the intensity function $I(d) = \frac{100}{d^2}$.

D: $d \neq 0$

R: $I \neq 0$

g. Describe the practical domain & ranges of this function. Explain.

P. Domain: since negative distances
makes no sense...

$d > 0$ (or, $x > 0$)

P. Range: $I > 0$ (or, $y > 0$)

can't have negative intensity.

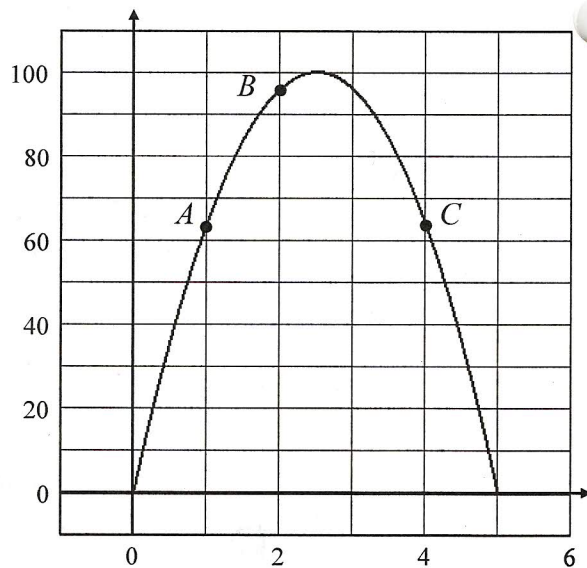
4. The graph below shows $y = h(t)$, which gives the height (in feet) of a toy rocket t seconds after it was launched.

- a) Label the point on the graph that corresponds to the rocket's launch with O and the highest point it reaches as M . Find the average rate of change of the height over the time intervals given below.

Time 1	Time 2	Average Rate of Change
0	1	65 ft/s
1	2	30
2	2.5	10
2.5	4	-23.3
1	4	0
2	3	0

$(0, 0)$
 $(1, 65)$
 $(1, 65)$
 $(2, 95)$ → $\frac{95-65}{2-1}$
 $(2, 95)$
 $(2.5, 100)$
 $(2.5, 100)$
 $(4, 65)$
 $(1, 65)$
 $(4, 65)$
 $(2, 95)$
 $(3, 95)$

height



time

$$\frac{y_2 - y_1}{x_2 - x_1}$$

- b. What are the units for the average rate of change?

ft/sec

- c. For which time intervals is the average rate of change positive?

0 to 1, 1 to 2, and 2 to 2.5 sec.

When is it negative?

2.5 to 4 sec

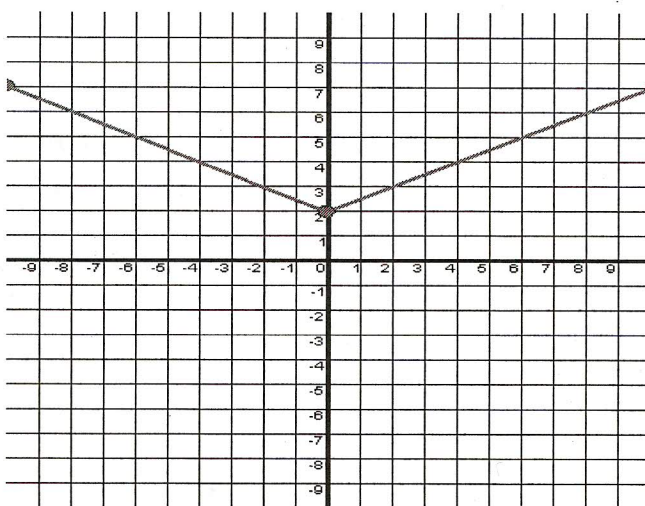
When is it zero?

1 to 4 and 2 to 3 sec

- d. Identify two intervals where one has a greater rate of change than the other.

0 to 1 sec has greater rate of change than 1 to 2 sec.

5. Examine the graph of $f(x)$.
The scale on the x and y-axis is 1.



- a. Is the function increasing, decreasing or both?

Both

- b. Does this function have a maximum or minimum value? If so, where?

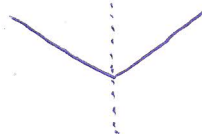
minimum at $(0, 2)$

- c. Does this function have any x or y-intercepts? If so, list them.

$(0, 2)$ is y-intercept, no x-intercepts

- d. Is the graph of this function symmetrical? If so, draw in a dashed line where the line of symmetry would be located.

Symmetric



- e. What is the theoretical domain and range of this function?

D: all reals

R: $y \geq 2$

- f. Find $f(2)$.

when $x=2$, $y=3$

so $f(2)=3$

- g. Find value(s) of x that satisfy the equation $f(x) = 5$.

when $y=5$, $x=6, -6$

- h. Is y a function of x ? Explain.

yes, every x I choose is paired with 1 y .

- i. Is x a function of y ? Explain.

no, some y value have ≥ 2 x values, like in part (g)