

1.2 Functions and Function Notation - Worksheet

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SOLUTIONS

1) For each function, determine $f(4)$, $f(-5)$, and $f\left(-\frac{2}{3}\right)$.

a) $f(x) = \frac{2}{5}x + 11$

$$\begin{aligned} f(4) &= \frac{2}{5}(4) + 11 & f(-5) &= \frac{2}{5}(-5) + 11 & f\left(-\frac{2}{3}\right) &= \left(\frac{2}{5}\right)\left(-\frac{2}{3}\right) + 11 \\ &= \frac{8}{5} + \frac{55}{5} & &= -2 + 11 & &= -\frac{4}{15} + \frac{165}{15} \\ &= \frac{63}{5} & &= 9 & &= \frac{161}{15} \end{aligned}$$

b) $f(x) = 3x^2 + 2x + 1$

$$\begin{aligned} f(4) &= 3(4)^2 + 2(4) + 1 & f(-5) &= 3(-5)^2 + 2(-5) + 1 \\ &= 48 + 8 + 1 & &= 75 - 10 + 1 \\ &= 57 & &= 66 \end{aligned}$$

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

$$= \frac{12}{9} - \frac{4}{3} + 1$$

$$= \frac{12}{9} - \frac{12}{9} - \frac{9}{9}$$

$$= 1$$

d) $f(x) = -6$

$$f(4) = -6 \quad f(-5) = -6 \quad f\left(-\frac{2}{3}\right) = -6$$

c) $f(x) = 2(x+4)^2$

$$\begin{aligned} f(4) &= 2(4+4)^2 & f(-5) &= 2(-5+4)^2 \\ &= 2(64) & &= 2(1) \\ &= 128 & &= 2 \end{aligned}$$

$$f\left(-\frac{2}{3}\right) = 2\left(-\frac{2}{3} + \frac{12}{3}\right)^2$$

$$= 2\left(\frac{10}{3}\right)^2$$

$$= \frac{200}{9}$$

e) $f(x) = \frac{1}{x}$

$$\begin{aligned} f(4) &= \frac{1}{4} & f(-5) &= -\frac{1}{5} & f\left(-\frac{2}{3}\right) &= \frac{1}{\left(-\frac{2}{3}\right)} \\ & & & & &= \frac{1}{1} \div \frac{-2}{3} \\ & & & & &= \frac{1}{1} \times \frac{3}{-2} \\ & & & & &= -\frac{3}{2} \end{aligned}$$

f) $f(x) = \sqrt{x+5}$

$$\begin{aligned} f(4) &= \sqrt{4+5} & f(-5) &= \sqrt{-5+5} \\ &= 3 & &= 0 \end{aligned}$$

$$f\left(-\frac{2}{3}\right) = \sqrt{-\frac{2}{3} + \frac{15}{3}}$$

$$= \sqrt{\frac{13}{3}}$$

2) If $f(x) = x^2 + 2$, state the following.

a) $f(1) = (1)^2 + 2$
 $= 3$

b) $f(0) = (0)^2 + 2$
 $= 2$

c) $f(2) = (2)^2 + 2$
 $= 6$

d) $f(-2) = (-2)^2 + 2$
 $= 6$

e) $f(3) = (3)^2 + 2$
 $= 11$

f) $f\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 + 2$
 $= \frac{1}{4} + \frac{8}{4}$
 $= \frac{9}{4}$

3) State $f(4)$ for each of the following functions.

a) $f(x) = 4 + 5x$
 $f(4) = 4 + 5(4)$
 $= 24$

b) $f(x) = x^2 - 6$
 $f(4) = (4)^2 - 6$
 $= 10$

c) $f(t) = 9 - t$
 $f(4) = 9 - 4$
 $= 5$

d) $f(x) = 10$
 $f(4) = 10$

e) $f(z) = z^3$
 $f(4) = (4)^3$
 $= 64$

f) $f(x) = 8(5 - x)$
 $f(4) = 8(5 - 4)$
 $= 8(1)$
 $= 8$

g) $f(x) = \frac{1}{x}$

$f(4) = \frac{1}{4}$

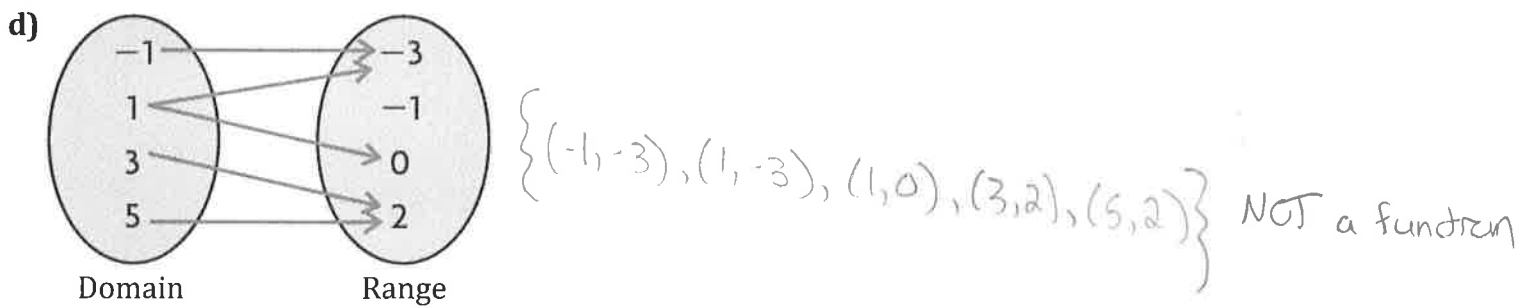
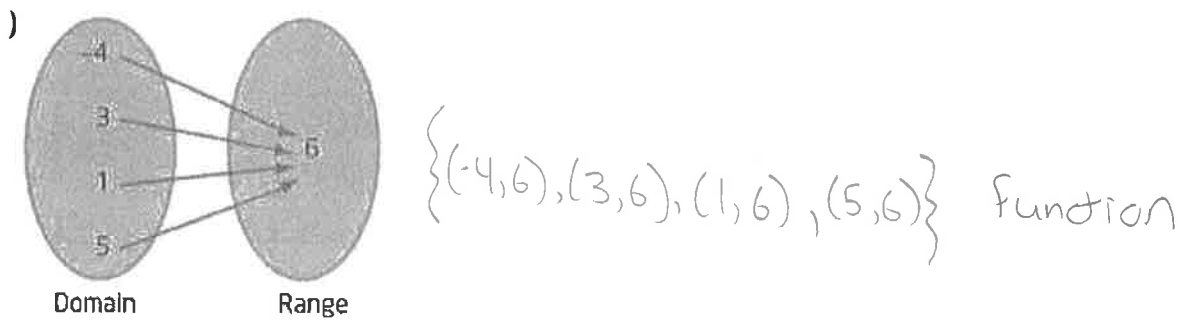
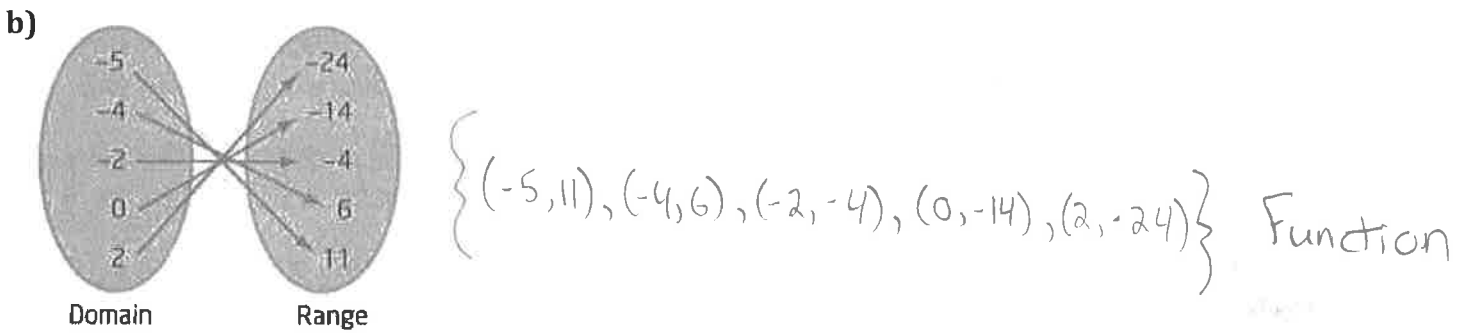
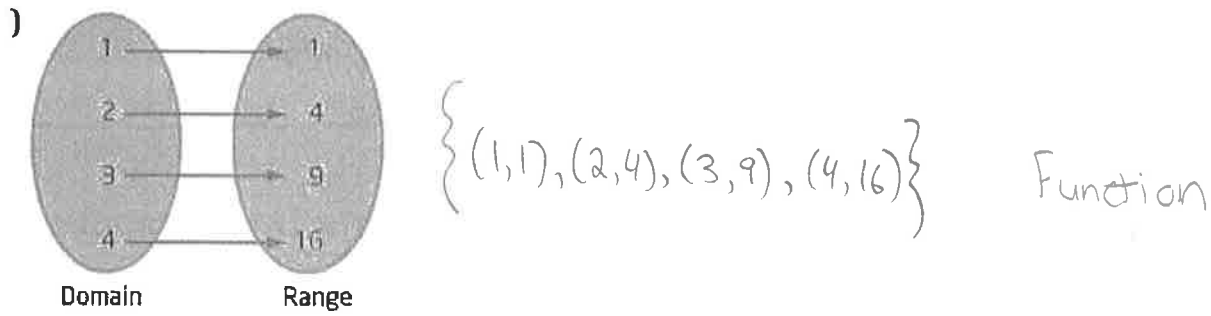
h) $f(x) = \sqrt{13 - x}$

$f(4) = \sqrt{13 - 4}$
 $= \sqrt{9}$
 $= 3$

i) $f(t) = \frac{1}{t^2}$

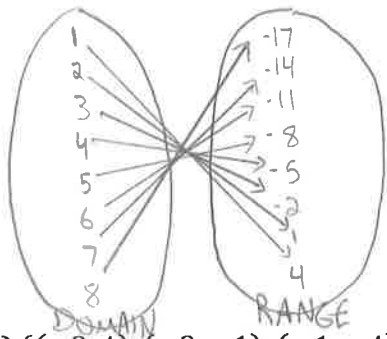
$f(4) = \frac{1}{4^2}$
 $= \frac{1}{16}$

4) Write the ordered pairs associated with each mapping diagram. Then state if the relation is a function.



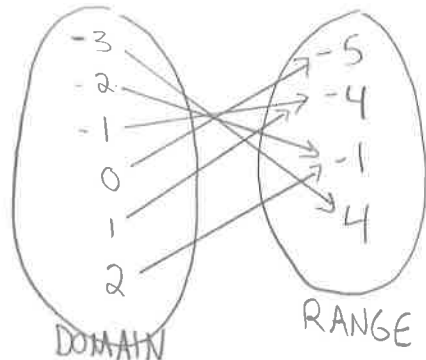
5) Show each set of data in a mapping diagram. Then state if the relation is a function.

a) $\{(1, 4), (2, 1), (3, -2), (4, -5), (5, -8), (6, -11), (7, -14), (8, -17)\}$



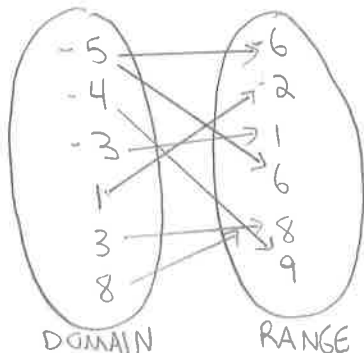
FUNCTION

b) $\{(-3, 4), (-2, -1), (-1, -4), (0, -5), (1, -4), (2, -1)\}$



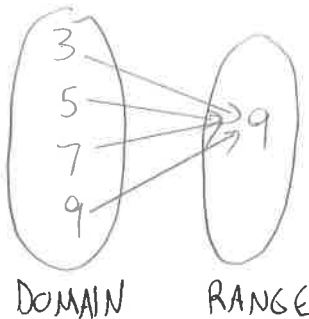
FUNCTION

c) $\{(-5, 6), (-4, 9), (-3, 1), (-5, -6), (1, -2), (3, 8), (8, 8)\}$



NOT A FUNCTION

d) $\{(9, 9), (7, 9), (5, 9), (3, 9)\}$



6) State the domains of the following functions

a) $f(x) = \sqrt{8-x}$

$\{x \in \mathbb{R} \mid x \leq 8\}$

b) $f(x) = \frac{x^2+3}{(x-1)(x+3)}$

$\{x \in \mathbb{R} \mid x \neq 1, -3\}$

Answers

1) a) $\frac{63}{5}, 9, \frac{161}{15}$ b) 57, 66, 1 c) 128, 2, $\frac{200}{9}$ d) -6, -6, -6 e) $\frac{1}{4}, -\frac{1}{5}, -\frac{3}{2}$ f) 3, 0, $\sqrt{\frac{13}{3}}$

2) a) 3 b) 2 c) 6 d) 6 e) 11 f) $\frac{9}{4}$

3) a) 24 b) 10 c) 5 d) 10 e) 64 f) 8 g) $\frac{1}{4}$ h) 3 i) $\frac{1}{16}$

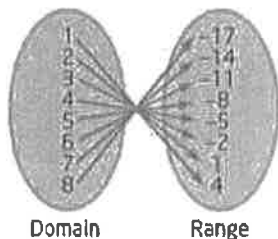
4) a) $\{(1, 1), (2, 4), (3, 9), (4, 16)\}$ this relation is a function

b) $\{(-5, 11), (-4, 6), (-2, -4), (0, -14), (2, -24)\}$ this relation is a function

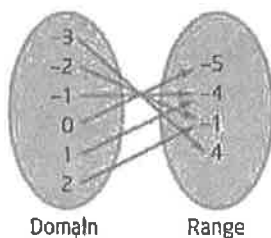
c) $\{(-4, 6), (3, 6), (1, 6), (5, 6)\}$ this relation is a function

d) $\{(-1, -3), (1, -3), (1, 0), (3, 2), (5, 2)\}$ this relation is NOT a function

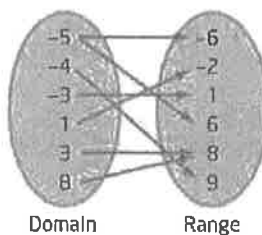
5) a) function



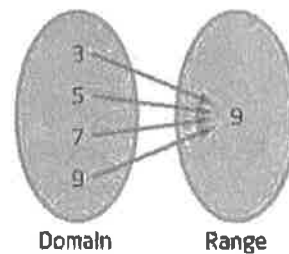
b) function



c) Not a function



d) function



) a) $\{X \in \mathbb{R} | x \leq 8\}$ b) $\{X \in \mathbb{R} | x \neq 1, x \neq -3\}$

