Worksheet 7b

1. Answer the following questions:

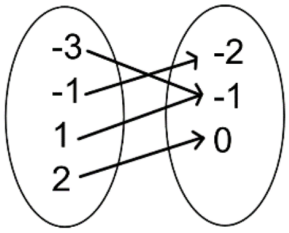
   a. $f = \{(10,7), (-2,4), (5,3), (4,10)\}$

      Domain:

      Range:

      $f(10) =$

   b.

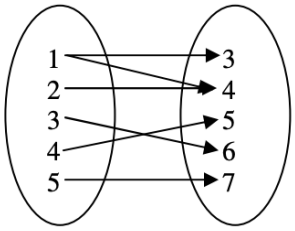


      Domain:

      Range:

      $f(\text{-}3) =$

   c.

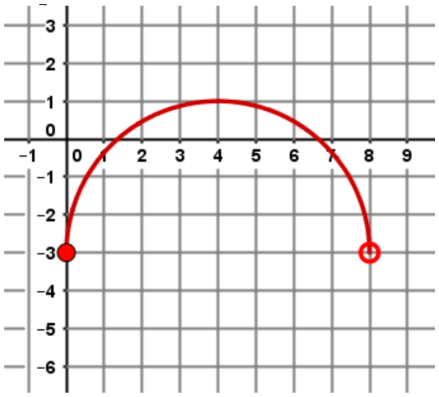


      Domain:

      Range:

      Is it a function?

d.

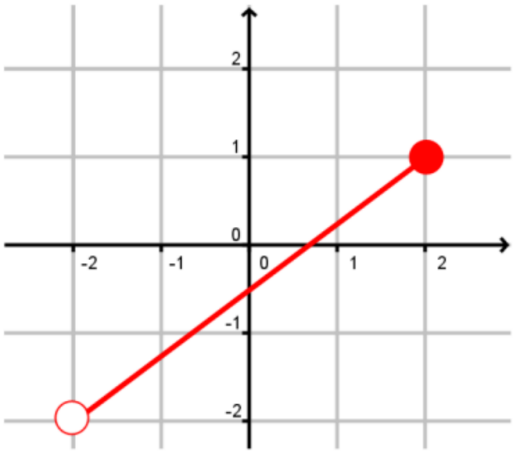


Domain:

Range:

$f(0) =$

e.

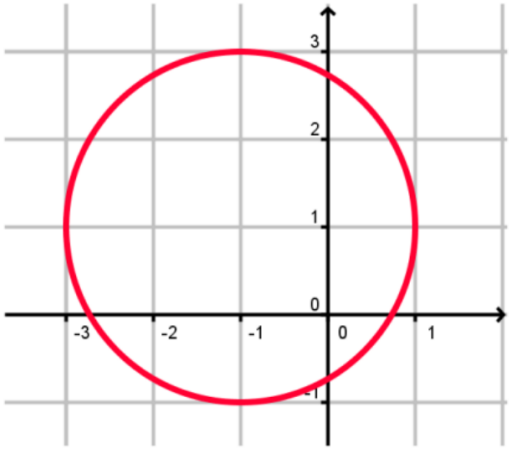


Domain:

Range:

Is it a function?

f.

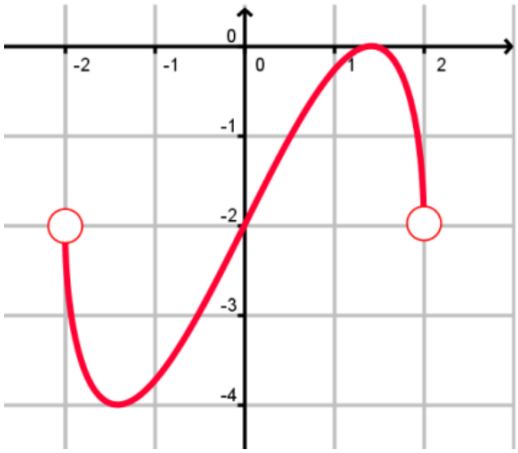


Domain:

Range:

Is it a function?

g.



Domain:

Range:

Is it a function?

2. Let $f: \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = x$

   a. What is the domain of f?

   b. What is the codomain of f?

   c. Is f a function?

   d. What is the image of f?

   e. What is the preimage of $[4,9]$?

   f. Is f injective (one-to-one)? If so, prove the statement (**Ch. 5.5**)

   g. Is f surjective (onto)? If so, prove the statement (**Ch. 5.5**)

3. Let $f: \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = x^2$

   a. What is the domain of f?

   b. What is the codomain of f?

   c. Is f a function?

   d. What is the image of f?

   e. What is the preimage of $[4,9]$?

   f. Is f injective (one-to-one)? If so, prove the statement (**Ch. 5.5**)

   g. Is f surjective (onto)? If so, prove the statement (**Ch. 5.5**)

4. Let $f: \mathbb{N} \to \mathcal{P}(\mathbb{N})$ be defined by $f(n) = \{1, 2, 3, \ldots, n\}$

   a. What is the domain of f?

   b. What is the codomain of f?

   c. Is f a function?

   d. What is the image of f?

   e. What is the preimage of $\{\{1,2,3\}, \{1,2,3,4,5\}\}$?

   f. Is f injective (one-to-one)? If so, prove the statement (**Ch. 5.5**)

   g. Is f surjective (onto)? If so, prove the statement (**Ch. 5.5**)

5. Let $f: \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ be defined by $f\big((x, y)\big) = x + 2y$

   a. What is the domain of f?

   b. What is the codomain of f?

   c. Is f a function?

   d. What is the image of f?

   e. What is the preimage of $\{0\}$?

   f. Is f injective (one-to-one)? If so, prove the statement (**Ch. 5.5**)

   g. Is f surjective (onto)? If so, prove the statement (**Ch. 5.5**)

6. Let $f: \mathbb{N} \to \mathbb{N}$ be defined by $f(n) = n + 1$ (**Ch. 5.5**)

   a. Is f injective (one-to-one)? If so, prove the statement

   b. Is f surjective (onto)? If so, prove the statement