Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 6th edition
Extra Examples

Section 2.3—Functions

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

---

p.135, icon at Example 3

#1. Determine if the following describes a function with the given domain and codomain.

$f\colon \mathbf{N} \to \mathbf{N}$ where $f(n)$ is equal to the sum of the digits in n.

See Solution

---

p.135, icon at Example 3

#2. Determine if each of the following describes a function with the given domain and codomain.

(a) $f\colon \mathbf{N} \to \mathbf{N}$ where $f(n) = 7 - n$.

(b) $f\colon \mathbf{N} \to \mathbf{Z}$ where $f(n) = 7 - n$.

See Solution

---

p.135, icon at Example 3

#3. Determine if each of the following describes a function with the given domain and codomain.

(a) $f\colon \mathbf{N} \to \mathbf{N}$ where $f(n) = \frac{1}{n-\pi}$.

(b) $f\colon \mathbf{N} \to \mathbf{R}$ where $f(n) = \frac{1}{n-\pi}$.

(c) $f\colon \mathbf{R} \to \mathbf{R}$ where $f(n) = \frac{1}{n-\pi}$.

See Solution

---

p.135, icon at Example 3

#4. Determine if the following describes a function with the given domain and codomain.

$f\colon \mathbf{N} \to \mathbf{N}$ where $f(n) = \begin{cases} x+4, & \text{if } n < 7 \\ x^2, & \text{if } n > 11. \end{cases}$

See Solution

---

p.135, icon at Example 3

#5. Determine if the following describes a function with the given domain and codomain.

$f\colon \mathbf{N} \to \mathbf{N}$ where $f(n) = \begin{cases} x+4, & \text{if } n < 7 \\ x^2, & \text{if } n > 4. \end{cases}$

See Solution

---

p.136, icon at Example 8

#1. Let $f\colon \mathbf{N} \to \mathbf{Z}$ be defined by the two-part rule $f(n) = \begin{cases} n/2, & \text{if } n \text{ is even} \\ -(n+1)/2, & \text{if } n \text{ is odd.} \end{cases}$
Determine whether f is one-to-one.

See Solution

---

p.138, icon at Example 11

#1. Let $f\colon \mathbf{N} \to \mathbf{Z}$ be defined by the two-part rule $f(n) = \begin{cases} n/2, & \text{if } n \text{ is even;} \\ -(n+1)/2, & \text{if } n \text{ is odd.} \end{cases}$
Determine whether f is onto $\mathbf{Z}$.

See Solution

---

p.138, icon at Example 11

#2. Find a function $f\colon \mathbf{Z} \to \mathbf{N}$ that is one-to-one but not onto.

See Solution

---

p.138, icon at Example 11

#3. Find a function $f\colon \mathbf{Z} \to \mathbf{N}$ that is one-to-one and onto.

See Solution

---

p.145, icon at Example 27

#1. Let $f\colon \mathbf{R} \to \mathbf{R}$ have the rule $f(x) = \lfloor 3x \rfloor - 1$. Find $f(S)$ where $S = [1, 3]$.

See Solution

p.145, icon at Example 27

#2. Let $f\colon \mathbf{R} \to \mathbf{R}$ have the rule $f(x) = \lfloor 3x \rfloor - 1$. Find $f^{-1}(S)$ where $S = \{0\}$

See Solution

p.145, icon at Example 27

#3. Let $f\colon \mathbf{R} \to \mathbf{R}$ have the rule $f(x) = \lfloor 3x \rfloor - 1$ and $g\colon \mathbf{R} \to \mathbf{R}$ have the rule $g(x) = x/3$. Find $f \circ g(T)$ where $T = [-3, 3.5]$.

See Solution

p.145, icon at Example 27

#4. Let $f\colon \mathbf{R} \to \mathbf{R}$ have the rule $f(x) = \lfloor 3x \rfloor - 1$.

(a) Find $(f \circ f)(1)$.

(b) Find $(f \circ f)(U)$ where $U = [2, 3]$.

See Solution

p.145, icon at Example 27

#5. Let $f\colon \mathbf{R} \to \mathbf{R}$ have the rule $f(x) = \lfloor 3x \rfloor - 1$ and $g\colon \mathbf{R} \to \mathbf{R}$ have the rule $g(x) = x/3$.

(a) Find $(f \circ g)^{-1}(\{2.5\})$.

(b) Find $(f \circ g)^{-1}(\{2\})$.

See Solution

p.145, icon at Example 27

#6. Find all solutions to $\lceil x \rceil + \lfloor x \rfloor = 2x$.

See Solution

---

p.145, icon at Example 27

#7. Find all solutions to $\lfloor x \rfloor \lceil x \rceil = x^2$.

See Solution

---

p.145, icon at Example 27

#8. Use the floor and/or ceiling function to find a formula for computing the units' digit of a positive integer n.

See Solution
