

Find the domain and codomain of these functions.

1. Assigns to each bit string the number of 1s minus the number of 0s. e.g. $f(00011) = -1$
2. Assigns to each bit string twice the number of 0s in that string. e.g. $f(00011) = 3*2 = 6$
3. Assigns to each pair of positive integers the maximum of those two integers.
4. What is: $\lfloor 1\frac{3}{4} \rfloor$
5. What is: $\lceil 1\frac{3}{4} \rceil$

Which functions from $\{a,b,c,d\}$ to $\{1,2,3,4\}$ are one-to-one; which are onto?

6. $f(a) = 1, f(b)=2, f(c)=3, f(d)=4$

7. $f(a) = 1, f(b)=1, f(c)=4, f(d)=4$

Determine whether $f: \mathbf{R} \rightarrow \mathbf{R}$ is one-to-one and onto:

8. $f(x) = 2x+1$

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

10. Find $f \circ g$ where $f(x) = 2x^3+x$ and $g(x) = x+5$ are functions from \mathbf{R} to \mathbf{R} .

Find these terms of sequence $\{a_n\}$ where $a_n = (-2)^n$

11. a_0

12. a_1

13. a_4

What are the values of these sums?

14.
$$\sum_{k=0}^5 1$$

15.
$$\sum_{k=0}^3 (-2)^k$$

16.
$$\sum_{j=0}^2 \sum_{i=1}^2 i * j$$

Find the domain and range of these functions.

1. Assigns to each bit string the number of 1s minus the number of 0s. e.g. $f(00011) = -1$
Domain: set of bit strings
Codomain : set of integers
2. Assigns to each bit string twice the number of 0s in that string. e.g. $f(00011) = 3*2 = 6$
Domain: set of bit strings
Codomain: the even of \mathbf{N}
3. Assigns to each pair of positive integers the maximum of those two integers.
Domain: \mathbf{N}^+
Codomain: \mathbf{N}^+
4. What is: $\lfloor 1\frac{3}{4} \rfloor$ 1
5. What is: $\lceil 1\frac{3}{4} \rceil$ 2

Which functions from $\{a,b,c,d\}$ to $\{1,2,3,4\}$ are one-to-one; which are onto?

6. $f(a) = 1, f(b)=2, f(c)=3, f(d)=4$ one-to-one, onto

7. $f(a) = 1, f(b)=1, f(c)=4, f(d)=4$ No, No

Determine whether $f: \mathbf{R} \rightarrow \mathbf{R}$ is one-to-one and onto:

8. $f(x) = 2x+1$ Yes

9. $f(x) = x^2$ No

10. Find $f \circ g$ where $f(x) = 2x^3+x$ and $g(x) = x+5$ are functions from \mathbf{R} to \mathbf{R} .

$$f \circ g = f(g(x)) = f(x+5) = 2(x+5)^3 + (x+5)$$

Find these terms of sequence $\{a_n\}$ where $a_n = (-2)^n$

$$11. a_0 = (-2)^0 = 1$$

$$12. a_1 = (-2)^1 = -2$$

$$13. a_4 = (-2)^4 = 16$$

What are the values of these sums?

$$14. \sum_{k=0}^5 1 = 1 + 1 + 1 + 1 + 1 + 1 = 6$$

$$15. \sum_{k=0}^3 (-2)^k = (-2)^0 + (-2)^1 + (-2)^2 + (-2)^3 = 1 - 2 + 4 - 8 = -5$$

$$16. \sum_{j=0}^2 \sum_{i=1}^2 i * j = (1*0) + (2*0) + (1*1) + (2*1) + (1*2) + (2*2) \\ = 0 + 0 + 1 + 2 + 2 + 4 \\ = 9$$