

(1) Determine whether f is a function from \mathbb{Z} to \mathbb{R} if

(a) $f(n) = \pm n$

(b) $f(n) = \sqrt{n^2 + 1}$

(c) $f(n) = 1/(n^2 - 4)$

(2) Determine whether the function $f : \mathbb{Z} \times \mathbb{Z} \rightarrow \mathbb{Z}$ is onto if

(a) $f(m, n) = m + n$

(b) $f(m, n) = m^2 + n^2$

(c) $f(m, n) = m$

(d) $f(m, n) = |n|$

(e) $f(m, n) = m - n$

- (3) Consider these functions from the set of students in a discrete mathematics class. Under what conditions is the function one-to-one if it assigns to a student his or her
- (a) mobile phone number

 - (b) student identification number

 - (c) final grade in the class

 - (d) home town
- (4) Determine whether each of these functions is a bijection from \mathbb{R} to \mathbb{R} .
- (a) $f(x) = 2x + 1$

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

 - (c) $f(x) = x^3$

 - (d) $f(x) = (x^2 + 1)/(x^2 + 2)$