

1. Why is f not a function from \mathbf{R} to \mathbf{R} if
 - a) $f(x) = 1/x$?
 - b) $f(x) = \sqrt{x}$?
 - c) $f(x) = \pm\sqrt{(x^2 + 1)}$?

15. Determine whether the function $f: \mathbf{Z} \times \mathbf{Z} \rightarrow \mathbf{Z}$ 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) $f(m, n) = m - n$.

23. Determine whether each of these functions is a bijection from \mathbf{R} to \mathbf{R} .
 - a) $f(x) = 2x + 1$
 - b) $f(x) = x^2 + 1$
 - c) $f(x) = x^3$
 - d) $f(x) = (x^2 + 1)/(x^2 + 2)$

29. Show that the function $f(x) = |x|$ from the set of real numbers to the set of nonnegative real numbers is not invertible, but if the domain is restricted to the set of nonnegative real numbers, the resulting function is invertible.

33. Suppose that g is a function from A to B and f is a function from B to C .
 - a) Show that if both f and g are one-to-one functions, then $f \circ g$ is also one-to-one.
 - b) Show that if both f and g are onto functions, then $f \circ g$ is also onto.

35. Find an example of functions f and g such that $f \circ g$ is a bijection, but g is not onto and f is not one-to-one.

41. Show that the function $f(x) = ax + b$ from \mathbf{R} to \mathbf{R} , where a and b are constants with $a \neq 0$ is invertible, and find the inverse of f .