Math 2001 - Assignment 13

Due April 27, 2018

(1) (a) Give domain, codomain, and range of $f\colon \mathbb{Z} \to \mathbb{Z},\ x \mapsto 4x+1$. What is $f(9)$?
    (b) Is f one-to-one, onto, bijective?
(2) Give examples for
    (a) a function $f\colon \mathbb{Z} \to \mathbb{Z}$ that is not injective but surjective;
    (b) a function $g\colon \{1,2,3\} \to \{1,2\}$ that is neither injective nor surjective;
    (c) a bijective function $h\colon \{1,2,3\} \to \{1,2\}$.
(3) (a) Show that
$$f : \mathbb{R} - \{1\} \to \mathbb{R} - \{2\}, x \mapsto \frac{2x+1}{x-1}$$
    is bijective.
    (b) Determine f^{-1}.
(4) Try to you find an inverse for $f\colon \mathbb{R} \to \mathbb{R}^+,\ x \mapsto e^{x^3+1}$. Is f bijective?
(5) Find the inverse for $f\colon \mathbb{R}^2 \to \mathbb{R}^2,\ (x,y) \mapsto (3x+y, x-2y)$.
(6) Let A, B be finite sets with $|A| = |B|$, and let $f\colon A \to B$ be surjective. Show that f is bijective.

    Is this true for surjective functions between infinite sets as well?