

Precalculus Review

Consider the maps defined below for this worksheet:

$$f : \mathbb{R} \rightarrow \mathbb{R}$$
$$x \mapsto (x - 2)^2$$

$$g : \mathbb{R} \setminus \{1\} \rightarrow \mathbb{R}$$
$$x \mapsto \frac{1}{x-1}$$

$$h : \mathbb{R} \rightarrow \mathbb{Z}$$
$$x \mapsto \lfloor x \rfloor$$

$$j : \mathbb{R} \rightarrow \mathbb{R}$$
$$x \mapsto \pm\sqrt{x} + 2$$

$$k : \mathbb{R} \setminus \{0\} \rightarrow \mathbb{R} \setminus \{1\}$$
$$x \mapsto \frac{1}{x} + 1$$

$$l : \{-4, -3, 2, 4, 5, 6\} \rightarrow \{0, 1\}$$
$$x \mapsto \text{remainder of } x/2$$

1. Identify which of the above maps are functions and which are not. (If you do not remember the definition of a function consult page 139.)
 - (a) $f(3)$
 - (b) (pg 141) the range/image of f
 - (c) (pg 139) the pre image of 4 under f
 - (d) (pg 141) $(f + g)(-1)$
 - (e) (pg 141) $(fg)(x)$
 - (f) (pg 146) $(f \circ g)(x)$
3. (pg 141) Of the functions you identified in (1.) which are one-to-one/injections?
4. (pg 144) Of the functions you identified in (1.), which are bijections/has an inverse? Find the inverses that exist.

5. (pg 143) Create a function m that is onto/a surjection but not one-to-one.

6. (pg 145) *Prove* that the function g is one-to-one.