

Precalculus Review

Consider the maps defined below for this worksheet:

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

$$h : \mathbb{R} \rightarrow \mathbb{Z} \text{ (in Sage, } \lfloor x \rfloor \text{ is "floor(x)")}$$
$$x \mapsto \lfloor x \rfloor$$

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

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

1. Enter the maps above into Sage.
2. Use the sage graphs or evaluations to find the following:

$$g(3.11111)$$

$$h(3.11111)$$

$$(f + g)(-1)$$

$$\begin{pmatrix} h \\ g \end{pmatrix} (1)$$

3. Find the rules for the new functions:

$$(f \circ g)(x)$$

$$(fg)(x)$$

4. Identify which of the original maps listed at the top of the page are functions and which are not. Justify your answers.
5. For each of the functions your identified, find the range/image.
6. For each of the functions your identified, which are bijections/has an inverse? Find the inverses that exist.