

## MATH 250 HANDOUT 12 - FUNCTIONS

- (1) Give an example of a function with each of the following domain/codomains.
- (a)  $\mathbb{Z} \rightarrow \mathbb{Z} \times \mathbb{Z}$ .
  - (b)  $\mathbb{Z} \times \mathbb{Z} \rightarrow \mathbb{Z}$ .
  - (c)  $\mathbb{Z} \rightarrow \mathbb{Z}_{>0}$ .
  - (d)  $\mathbb{R} \rightarrow \mathbb{Z}$ .
  - (e)  $P(\mathbb{R}) \rightarrow P(\mathbb{Z})$ .
  - (f)  $\mathbb{Z} \rightarrow P(\mathbb{Z})$ .
  - (g)  $P(\mathbb{Z}) \rightarrow \mathbb{Z}$ .

- (2) Draw a picture of two different functions from  $\{1, 2, 3\} \rightarrow \{4, 5\}$ .

### Images

(3) Let  $f: A \rightarrow B$  be a function. Finish the following sentence: an element  $b \in B$  is not in the image of  $f$  if  $\dots$

(4) Compute the image of the following functions:

(a)  $g: \mathbb{Z} \rightarrow \mathbb{Z}$ , where  $g(x) = 2n + 1$ ;

(b)  $g: \mathbb{R} \rightarrow \mathbb{R}$ , where  $g(x) = 2x + 3$ ;

(c)  $f: \mathbb{R} \rightarrow \mathbb{R}$ , where  $f(x) = -x^2 + 1$ ;

(d)  $\cos: \mathbb{R} \rightarrow \mathbb{R}$ ;

(e)  $\tan^{-1}: \mathbb{R} \rightarrow \mathbb{R}$ ;