

Math 300 In-Class Worksheet 9: Introduction to Functions

- 1) (# 3, Section 6.1) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = x^2 - 2x$.
- (a) Evaluate $f(-3)$, $f(-1)$, $f(1)$, and $f(3)$.
 - (b) Determine the set of all of the preimages of 0 and the set of all of the preimages of 4.
 - (c) Sketch a graph of the function f .
 - (d) Determine the range of the function f .

2) For each of the following, determine the largest set $A \subseteq \mathbb{R}$, such that $f : A \rightarrow \mathbb{R}$ defines a function. Next, determine the range,

$$f(A) := \{y \in \mathbb{R} : f(x) = y, \text{ for some } x \in A\}.$$

(a) $f(x) = 1 + x^2$,

(b) $f(x) = 1 - \frac{1}{x}$,

(c) $f(x) = \sqrt{3x - 1}$,

(d) $f(x) = x^3 - 8$,

(e) $f(x) = \frac{x}{x - 3}$.

3) List all possible different functions $f : \{a, b\} \rightarrow \{0, 1, 2\}$

4) Consider the determinant of a 2×2 matrix with real entries as a function, $\det(\cdot)$.

(a) What is the domain of \det ?

(b) What is the codomain of \det ?

(c) Describe the set $\det^{-1}(\mathbb{R} \setminus \{0\})$.

(d) Prove that $\det(AB) = \det(A) \det(B)$ for all 2×2 matrices A and B .

5) fun