
DISCRETE MATHEMATICS

MATH 381

BASIC CONCEPTS AND EXAMPLES EXPLAINING THE FUNDAMENTALS OF
DISCRETE MATHEMATICS.

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Contents

1 February 17, 2020

1

1 February 17, 2020

Recall:

- Functions $f: A \rightarrow B$
- Image $Im(f) = f(A)$

If $f(a) = b$, say "a is a preimage of b"

- $Gr(f) = \{(a, b) | f(a) = b\} \subseteq A \times B$
- $Gr(f) = \{(a, f(a)) | a \in A\}$

Graph $Gr(f)$ is a relation between A and B

Which binary relations (subsets of $A \times B$) are graphs of functions?

- A subset $s \subseteq A \times B$ is the graph of a function if for every element $a \in A$, there is a unique element $b \in B$ such that $(a, b) \in S$.
- key Can't have (a, b_1) and $(a, b_2) \in S$ where $b_1 \neq b_2$ and expect S to be a graph
- (abstraction of "straight line test" about graphs $f: \mathbb{R} \rightarrow \mathbb{R}$)