Relations between (different) sets

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$R \subseteq A \times A$ A set R subset $A = \mathbb{R}$

aRb means $(a,b) \in R \subseteq A \times A$.

if aRb means $a < b$, then $R = \{(a,b) \mid a < b\}$.

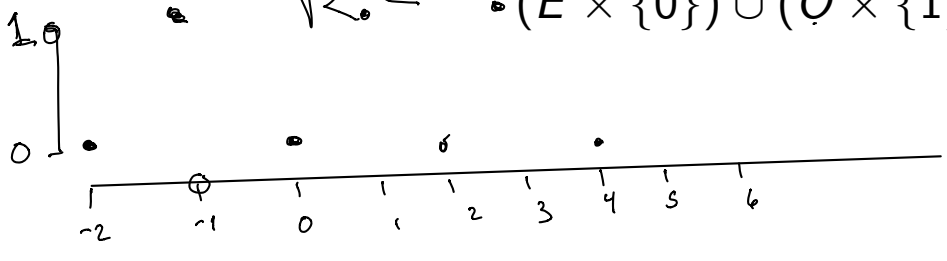
Is $3 < 5$? look to see if $(3,5) \in R$.

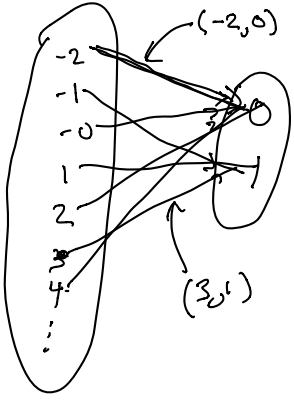
Up to now we considered a relation R on a single set A, viewed as a subset of the Cartesian Product $R \subseteq A \times A$.

Sometimes we want to capture a relationship a different sort of relationship.

- Consider the a relation between the integers $\mathbb{Z}$ and the set $0, 1$ where $aR0$ if a is even and $aR1$ if a is odd.
- This can be expressed as a subset $R \subseteq \mathbb{Z} \times \{0, 1\}$. If we let E and O be the sets of even and odd numbers respectively, then R consists of the pairs

$$R = (E \times \{0\}) \cup (O \times \{1\}).$$





Another example.

S is the set of applicants for residency programs. R is the of residency programs.

We can construct a relation $M \subseteq S \times R$ where sMr means that student s has a applied to program r

In this case the most natural picture might look like this