



## Section 1.1 continued

## Set builder notation (predicates)

Set builder notation is a way to construct sets out of other sets.

$$A = \{x \in \mathbb{Z} : x \geq 0\} \text{ or } A = \{x : x \in \mathbb{Z}, x \geq 0\}$$

- ▶  $A$  is the set of integers that are greater than or equal to zero

$$E = \{2n : n \in \mathbb{Z}\}$$

- ▶  $E$  is the set of things of the form  $2n$  where  $n$  is an integer

## Set builder notation continued

More generally, set builder notation looks like this:

$$X = \{\text{expression} : \text{rule}\}$$

and it captures all values of the expression that satisfy the rule.

# Intervals $\mathbb{R}$

Intervals are examples of sets given by set builder notation.

- ▶  $(a, b) = \{x \in \mathbb{R} : x > a \text{ and } x < b\}$  “open”
- ▶  $[a, b) = \{x \in \mathbb{R} : x \geq a \text{ and } x < b\}$  “half open”
- ▶  $(a, b] = \{x \in \mathbb{R} : x > a \text{ and } x \leq b\}$  “half open”
- ▶  $[a, b] = \{x \in \mathbb{R} : x \geq a \text{ and } x \leq b\}$  “closed”
- ▶  $[a, \infty) = \{x \in \mathbb{R} : x \geq a\}$  “infinite”
- ▶  $(a, \infty) = \{x \in \mathbb{R} : x > a\}$  “infinite”
- ▶  $(-\infty, a) = \{x \in \mathbb{R} : x < a\}$  “infinite”
- ▶  $(-\infty, a] = \{x \in \mathbb{R} : x \leq a\}$  “infinite”