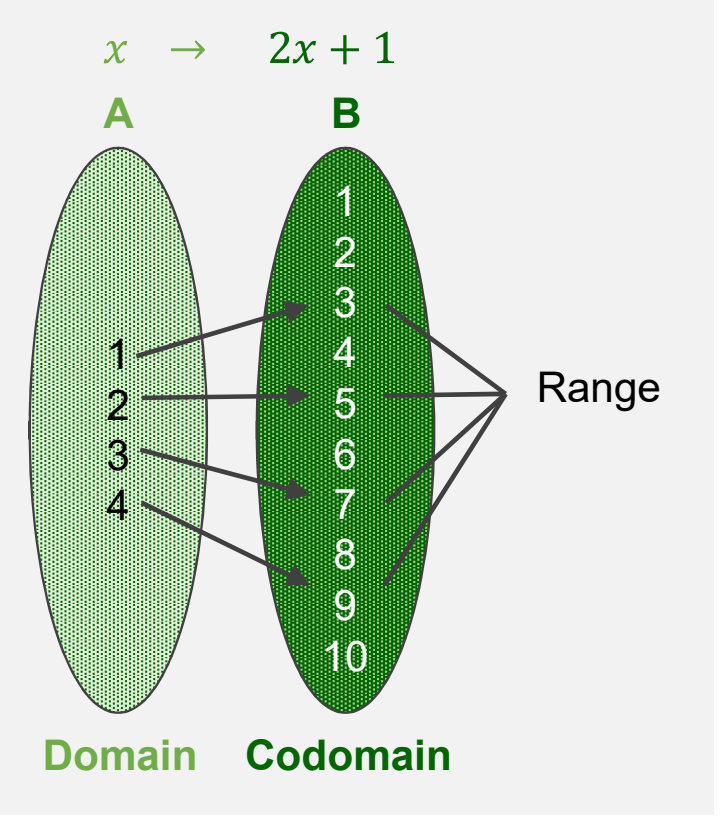
Transformation

- A **transformation**, **function**, or **mapping**, T maps an input x to an output y
  - Mathematical notation: T: $x \mapsto y$
- **Domain**: Set of all the possible values of x
- **Co-domain**: Set of all the possible values of y
- **Image**: a mapped output y, given x
- **Range**: Set of all the output values mapped by each x in the domain

- **Note**: the output mapped by a particular x is uniquely determined.



Linear Transformation

- **Definition**: A transformation (or mapping) T is **linear** if:

  I. $T\,(c\mathbf{u} + d\mathbf{v}) = cT\,(\mathbf{u}) + dT\,(\mathbf{v})$ for all $\mathbf{u}, \mathbf{v}$ in the domain of T and for all scalars c and d

- Simple example: $T\colon x \mapsto y,\ T(x) = y = 3x$