

# Unit 0 + preface: Functions

## Vocabulary and notation

upper bound	lower bound	estimate	set-builder notation
$[a, b]$	$[a, b)$	interval notation	$\{x \in S : \dots\}$
$\text{sign}(x)$	$\delta(x)$	sign function	delta function
concave up	concave down	increasing function	decreasing function
local maximum	local minimum	strictly increasing	strictly decreasing
$\mapsto$	upper bound	lower bound	monotone function
$\lfloor x \rfloor$	$\lceil x \rceil$	floor function	ceiling function
domain	range	even function	odd function
free variable	bound variable	definition by cases	greatest integer function
$:=$	tangent line	chord	

## Skills

- Fluency translating between equations and graphs (see graphing tips)
- Equation of a tangent line
- Tangent line estimate
- Recognize increasing and decreasing regions in a graph of a function
- Recognize concave upward and downward regions in a graph of a function
- Relation between concavity and tangent line estimate
- Write a verbally defined set in set-builder notation
- Recognize upper and lower bounds
- Start to be able to find upper and lower bounds
- Relation between shifts of a graph and algebra such as  $f(x + c)$ ,  $f(x) - c$ , etc.
- Relation between dilations of a graph and algebra such as  $f(cx)$ ,  $f(x)/c$ , etc.
- Moving between different ways of specifying functions:
  - a verbal rule
  - a set of ordered pairs
  - a lookup table
  - a graph
  - “mapsto” notation  $x \mapsto \dots$
  - definition by formula  $f(x) := \dots$ .