Linear Functions and Piecewise Linear Functions

Exercises

1. Find two *different* linear functions satisfying $\Delta y = 3\,\Delta x$.

2. Find a linear function satisfying $\Delta y = 3\,\Delta x$ *and* $y(0) = 2$. Sketch its graph.

Definition: A function f is *piecewise linear* if its graph on any finite interval consists of a finite number of line segments.

3. Consider the graph of the *absolute value* function $g(x) = |x|$, $x \in \mathbf{R}$ (all real numbers). Is $g(x)$ a piecewise linear function? In other words, is there a way to represent the full behavior of $g(x)$ using linear functions?

Consider the following function $h(t)$

$$h : [-1.5, 2] \to \mathbf{R}, \quad u = h(t) = \begin{cases} -2t, & -1.5 \leq t \leq 0 \\ 2t, & 0 < t \leq 1.5 \\ -t + 4.5, & 1.5 < t \leq 2 \end{cases}$$

5. What are the *domain* and *range* of $h(t)$?

6. *Evaluate:*
   $h(-1) =$

   $h(0) =$

   $h(4) =$

7. Sketch a graph of $h(t)$ below