## Chapter 2

Limits and Continuity

2.1

Rates of Change and Tangents to Curves

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Average speed: $\frac{\Delta y}{\Delta t} = \frac{16(t_0 + h)^2 - 16t_0^2}{h}$		
Length of time interval h	Average speed over interval of length $h$ starting at $t_0 = 1$	Average speed over interval of length $h$ starting at $t_0 = 2$
1	48	80
0.1	33.6	65.6
0.01	32.16	64.16
0.001	32.016	64.016
0.0001	32.0016	64.0016

**DEFINITION** The **average rate of change** of y = f(x) with respect to x over the interval  $[x_1, x_2]$  is

$$\frac{\Delta y}{\Delta x} = \frac{f(x_2) \, - \, f(x_1)}{x_2 \, - \, x_1} = \frac{f(x_1 \, + \, h) \, - \, f(x_1)}{h}, \qquad h \neq 0.$$