1.3 Rates of change

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- The average velocity can be found in the same way that we found the slope of the secant.

  average velocity = $\frac{\text{change in position}}{\text{change in time}}$

- The instantaneous velocity is the slope of the tangent to the graph of the position function and is found in the same way that we found the slope of the tangent.

- To find the average velocity (average rate of change) from $t = a$ to $t = a+h$, we can use the difference quotient and the position function $s(t)$

  $$\frac{\Delta s}{\Delta t} = \frac{s(a+h) - s(a)}{h}$$

- The rates of change in the position function, $s(t)$, is the velocity at $t = a$, and we can find it by computing the limiting value of the average velocity as $h \to 0$.

  $$v(a) = \lim_{h \to 0} \frac{s(a+h) - s(a)}{h}$$

⊙ Practice

1. 0 s and 4 s

2. a) slope of the secant from $(2, s(2))$ to $(9, s(9))$
   b) slope of the tangent at $x = 6$

3. slope of the tangent at $x = 4$ in $f(x) = \sqrt{x}$

4. a) A - B
   b) greatest
   c)