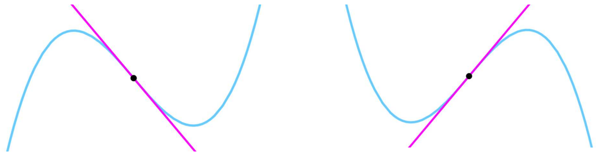
Maximum Rate of Change

Maximum Rate of Increase and Decrease

The point at which the function increases or decreases at the fastest rate can be identified by

- looking at points of inflection (not necessarily stationary) of the function.



- looking at the maximum and minimum values of the derivative function.

- looking at where the second derivative is 0.

Example VCAA 2017 NHT Exam 2 Question 1fii

The temperature, T °C, in an office is controlled. For a particular weekday, the temperature at time t, where t is the number of hours after midnight, is given by the function

$$T(t) = 19 + 6\sin\left(\frac{\pi}{12}(t-8)\right), \qquad 0 \le t \le 24$$

The temperature in the office decreasing most rapidly at

Decreasing most rapidly at a minimum of $T'(t) = \frac{\pi}{2}\cos\left(\frac{\pi}{12}(t-8)\right)$

Minimums of $T'(t)$ occur when $\cos\left(\frac{\pi}{12}(t-8)\right) = -1 \Rightarrow T'(t) = -\frac{\pi}{2}$

$$\cos\left(\frac{\pi}{12}(t-8)\right) = -1$$

$$\frac{\pi}{12}(t-8) = \pi$$

$$t - 8 = 12$$

$t = 20$ hours or at 8 pm.