

Suppose you put a yam in a hot oven, maintained at a constant temperature of  $200^{\circ}\text{C}$ . As the yam picks up heat from the oven, its temperature rises.<sup>6</sup>

- (a) Draw a possible graph of the temperature  $T$  of the yam against time  $t$  (minutes) since it is put into the oven. Explain any interesting features of the graph, and in particular explain its concavity.
- (b) Suppose that, at  $t = 30$ , the temperature  $T$  of the yam is  $120^{\circ}$  and increasing at the (instantaneous) rate of  $2^{\circ}/\text{min}$ . Using this information, plus what you know about the shape of the  $T$  graph, estimate the temperature at time  $t = 40$ .
- (c) Suppose in addition you are told that at  $t = 60$ , the temperature of the yam is  $165^{\circ}$ . Can you improve your estimate of the temperature at  $t = 40$ ?
- (d) Assuming all the data given so far, estimate the time at which the temperature of the yam is  $150^{\circ}$ .