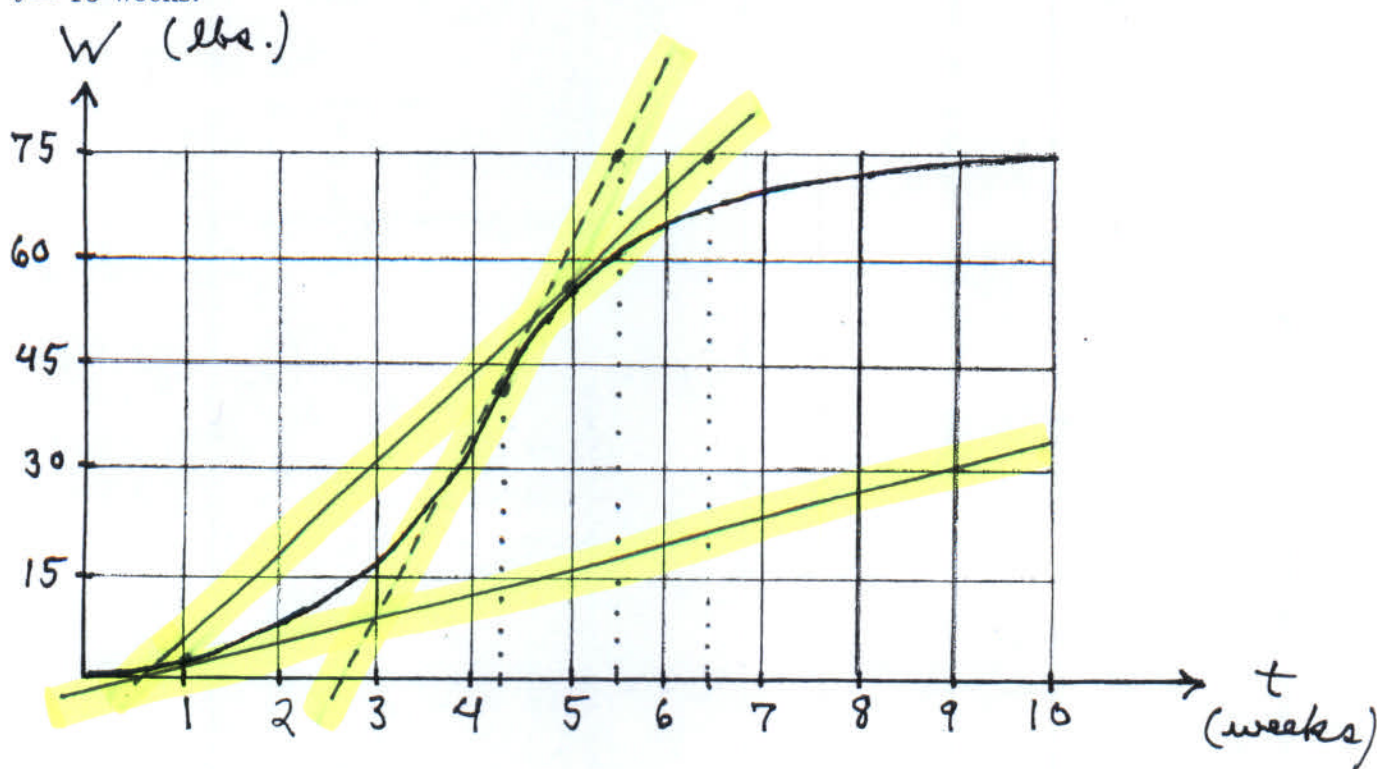


Math 21A

Kouba

Average and Instantaneous Rates of Change

Ex: The given graph represents the weight W (lbs.) of a pumpkin from $t = 0$ weeks to $t = 10$ weeks.



1.) Estimate the pumpkin's average growth rate (lbs./week) for

i.) $t = 0$ to $t = 10$ weeks.

$$\begin{aligned} \text{i.) } \text{ARC} &\approx \frac{75 - 0}{10 - 0} \\ &= 7.5 \text{ lbs./wk.} \end{aligned}$$

ii.) $t = 3$ to $t = 6$ weeks.

$$\begin{aligned} \text{ii.) } \text{ARC} &\approx \frac{65 - 18}{6 - 3} \\ &= \frac{47}{3} \approx 15.67 \text{ lbs./wk.} \end{aligned}$$

2.) Estimate the instantaneous growth rate of the pumpkin for

i.) $t = 1$ week.

$$\text{i.) } \text{IRC} \approx \frac{34 - 0}{10 - 0.5} \approx 3.58 \frac{\text{lbs.}}{\text{wk.}}$$

ii.) $t = 5$ weeks.

$$\text{ii.) } \text{IRC} \approx \frac{75 - 0}{6.4 - 0.5} \approx 12.7 \frac{\text{lbs.}}{\text{wk.}}$$

3.) Estimate the specific time t at which the pumpkin is growing most rapidly, and estimate the value of this rate.

$$t \approx 4.25 \text{ wks.}, \quad \text{IRC} \approx \frac{75 - 0}{5.5 - 2.6} \approx 25.86 \frac{\text{lbs.}}{\text{wk.}}$$