2.2 Estimating Instantaneous Rates of Change from Tables of Values and Equations (Part 2)

Math Learning Target:
"I can determine a reasonable estimate for the instantaneous rate of change using the methods presented, and interpret the result."

centred interval

an interval of the independent variable of the form $a - h \le x \le a + h$, where h is a small positive value; used to determine an average rate of change

HW p.86 #2bc, 4a* only use centred intervals

Ex. 1: *(from yesterday)*
A bacteria culture is growing exponentially and the population, *P*, is given by $P(n) = 200(1.2)^n$, where n is the number of hours. *Estimate,* to the nearest tenth, the instantaneous rate of change at 5 hours, by using a centred interval.

Recall:

$$\frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

centred interval

$4.999 \le n \le 5.001$

$aroc = m_{secant}$

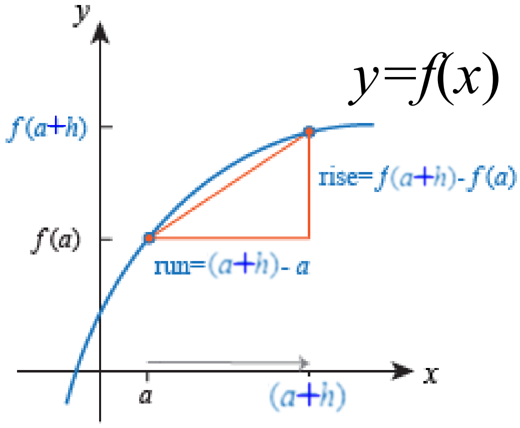
$$\frac{\Delta P}{\Delta n} = \frac{P(\quad) - P(\quad)}{\quad - \quad}$$

$$= \frac{200(1.02)\quad - 200(1.02)}{\quad - \quad}$$

Calculating the **EXACT** Instantaneous Rate of Change

Math Learning Target:
"I can calculate the **exact** instantaneous rate of change by using the 'first principles' method."

(if time)
GeoGebra 2.2_2 Secant to Tangent Demo



Ex.1: (Homework p.86 #3c)
Use 'first principles' to calculate the **exact** instantaneous rate of change at exactly 2.5 months.

$$P(t) = 100 + 30t + 4t^2$$

$iroc = m_{tangent}$

For each question, do NOT estimate the rate of change.
Rather, find the exact rate of change using 'first principles'.

pp. 86-87 #4c, 5, 10* do not approximate π

Challenge: For the function $y = \frac{1}{x}$ find the exact rate of change at x = 2.