Lecture #20

10/17/2016

Ex2 (Exercise 19 from your textbook): Consider a population that grows linearly following the recursive formula $P_N = P_{N-1} + 125$, with the initial population $P_0 = 80$.

(a) Find P_1, P_2, P_3

(b) Give an explicit f-la for P_N

(c) Find P_{100}

(b) $P_N = 80 + 125N$

(c) $P_{100} = 80 + 125 \cdot 100 = 12580$

(Answer: (a) $P_1 = 205$, $P_2 = 330$, $P_3 = 455$; (b) $P_N = 80 + 125N$, (c) $P_{100} = 12580$)

(Exercise 3.2.33)

Ex3: Consider a population that grows according to a linear growth model. The initial population is $P_0 = 23$, and the common difference is $d = 7$.

(a) Find $P_0 + P_1 + \_\_ + P_{999}$

(b) Find $P_{100} + \_\_ + P_{999}$

(a) $P_0 = 23$, $P_{999} = P_0 + 999 \cdot d = 23 + 999 \cdot 7 = 7016 \Rightarrow P_0 + \_ + P_{999} = \dfrac{1000 \cdot (P_0 + P_{999})}{2} = 3{,}519{,}500$

(b) $P_{100} = P_0 + 100 \cdot d = 723 \Rightarrow P_{100} + \_ + P_{999} = \dfrac{900 \cdot (P_{100} + P_{999})}{2} = 3{,}482{,}550$

ASK if there are any q-s about these 2 examples.

- Next population growth model: "Exponential Growth Model".

We start our discussion from the following notion:

Def: The growth rate of a population as it changes from an initial value X to a new value Y is given by the ratio $\boxed{r = \dfrac{Y-X}{X}}$ ⇝ converted into % by multiplying by 100%.

Terminology: In the above setup, we call X the baseline, Y - the end-value

Ex 4: Fill in the following table

Baseline (X)	End-Value (Y)	Growth rate % (r)
10	30	
20		50%
	60	100%

(If there are q-s, give a few more examples)