

Exam 3 Part 2 Question 6

a. Recurrence relation

a. $a_0 = 7.6 \text{ billion}$

b. $r = 1.12\% = 0.0112$

c. Each year the pop grows by 1.12%, so the pop is $\text{pop} * 1.12\%$

d. $a_n = a_{n-1} + 1.12\% * a_{n-1} = a_{n-1} + 0.0112 * a_{n-1} = 1.0112 * a_{n-1}$

b. Explicit formula

a. $a_n = 1.0112 * a_{n-1}$

b. $a_0 = 7.6 \text{ billion}$

c. $a_n = 1.0112a_{n-1} = 1.0112^1 a_{n-1}$

d. $= 1.0112(1.0112a_{n-2}) = 1.0112^2 a_{n-2}$

e. $= 1.0112^2(1.0112a_{n-3}) = 1.0112^3 a_{n-3}$

f. $= 1.0112^3(1.0112a_{n-4}) = 1.0112^4 a_{n-4}$

g. ...

h. $= 1.0112^n a_{n-n}$

i. $= 1.0112^n a_0$

j. $7.6 * 1.0112^n \text{ (in billions)}$

c. Population in 2050

a. $2050 - 2017 = 33$

b. $N = 33$

c. $a_{33} = 7.6 * 1.0112^{33} \approx 11.0 \text{ billion}$