

STAT 475
Quiz 1
Spring 2019

January 29, 2019

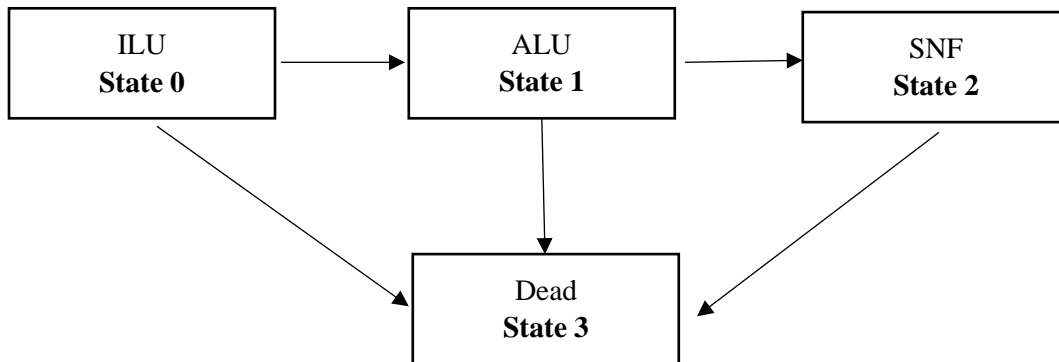
Elsie, who is now 70 years old, is entering a Continuing Care Retirement Community (CCRC) under a Full Lifecare (Type A) contract. She will move into an Independent Living Unit (ILU). Elsie pays a one-time fee of F immediately on entry and a level monthly fee of M at the start of each month that she is in the CCRC, including the first.

You are given:

- (i) The entry fee, F , is equal to $1/3$ of the expected present value of all future costs.
- (ii) The CCRC operates three types of accommodation; they are listed here, with the monthly costs incurred at the beginning of the month by the CCRC for each resident in each category:

Independent Living Unit (ILU): 4,000
 Assisted Living Unit (ALU): 8,000
 Specialized Nursing Facility (SNF): 13,000

- (iii) $i = 0.05$
- (iv) The monthly fee M is determined so that the expected present value of the monthly costs is equal to the expected present value of M plus the expected present value of F .
- (v) The CCRC uses the following multiple state model to determine the fee structure.



- (vi) The following actuarial functions have been evaluated for the model at $i = 0.05$

x	$\ddot{a}_x^{(12)00}$	$\ddot{a}_x^{(12)01}$	$\ddot{a}_x^{(12)02}$	$\ddot{a}_x^{(12)11}$	$\ddot{a}_x^{(12)12}$	$\ddot{a}_x^{(12)22}$	$A_x^{(12)03}$
70	9.5210	1.7037	0.4942	10.1754	0.9960	9.1961	0.4294
75	7.4080	2.1230	0.5122	8.2234	1.2121	7.4238	0.5231

Please note that this quiz is worth 20 points. You can earn 25 points total with a perfect score.

- (i) *(4 points)* You are given that F is 233,000 to the nearest 1000. Calculate F to the nearest 1.

- (ii) *(5 points)* Calculate M .

(iii) (5 points) Calculate ${}_5V^{(0)}$, the reserve five years after entry, assuming Elsie is in state 0.

(iv) (5 points) Calculate ${}_5V^{(1)}$, the reserve five years after entry, assuming Elsie is in state 1.

(v) (6 points) You are given that

$${}_{\frac{1}{12}}p_{70}^{00} = 0.94937 \quad {}_{\frac{1}{12}}p_{70}^{01} = 0.00906 \quad {}_{\frac{1}{12}}p_{70}^{02} = 0.00003$$

$${}_{1/12}V^{(1)} = 1,510,500 \quad {}_{1/12}V^{(2)} = 715,600$$

Calculate ${}_{\frac{1}{12}}V^{(0)}$.