REVIEW PROBLEMS (MIDTERM) PSTAT 172A

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February 2019

PROBLEM 1

You are given: $S_0(x) = 1 - \frac{x}{100}$ for $0 \le x \le 100$. Calculate $_{0.25}q_{45.75}$ assuming UDD within each year of age.

    A. $_{0.25}q_{45.75} < 0.002$ B. $0.002 \le\ _{0.25}q_{45.75} < 0.004$ C. $0.004 \le\ _{0.25}q_{45.75} < 0.006$ D. $0.006 \le\ _{0.25}q_{45.75} < 0.008$

Note: It is often easier to work with survival probability instead of mortality probability.

Review formulas for "fractional age" probability when (i) UDD or (ii) CMF. For example, fill in the table below, assuming $0 \le t \le 1$, and $0 \le t + s \le 1$

Probability	UDD	CMF
ℓ_{x+t}	....	....
$_tp_x$	....	....
$_tp_{x+s}$	....	....
μ_{x+s}	....	....

Note: $_tq_x = 1 -\ _tp_x$ and $_tq_{x+s} = 1 -\ _tp_{x+s}$

PROBLEM 2

You are given: (i) $\int_{30}^{30+t} \mu_x dx = ln\sqrt{1 + At}$, (ii) $\ell_{30} = 2000$, and (iii) $_{10}d_{40} = 173$.
Then A is nearest to:

    A. 0.02   B. 0.025   C. 0.03   D. 0.035   E. 0.04

PROBLEM 3

You are given the following information on participants entering a special 2-year program for treatment of a disease:

(i) Only 10% survive to the end of the second year

(ii) The force of mortality is constant within each year

(iii) The force of mortality for year 2 is three times the force of mortality for year 1

Calculate the probability that a participant who survives to the end of month 3 dies by the end of month 21.

PROBLEM 4

You are given:

(i) $q_{70} = 0.04$, (ii) $q_{71} = 0.044$.

Calculate $\mathring{e}_{70:\overline{1.5}|}$ assuming (a) UDD for each age of year and (b) CFM for each age of year.

PROBLEM 5

A car leasing company leases cars to customers for a three-year period.

- Each year 15% of the vehicles get into accidents.

- Different accident years are independent.

- At the end of the lease, 25% of the customers decide to keep their cars. This decision is made independently of their accident history.

- The company pays $1,000 bonus for each car returned that has not been in an accident.

- i=10%

What is the actuarial present value of the bonus payment at the time the car is leased?