1. Write in terms of ${}_{t|u}q_x$ the probability that (43) live to age 61 but does not survive to age 67.

- a. ${}_{6|18}q_{43}$
- b. ${}_{18|6}q_{61}$
- c. ${}_{18|6}q_{43}$
- d. ${}_{6|18}q_{61}$
- e. ${}_{6|25}q_{43}$
- Unanswered

The time is 9:15

2. The following mortality table is for United Kindom Males based on data from 2002-2004.
Click here to see the table in a different window
Compute $s(50)$.

- a. 0.946197
- b. 0.945647
- c. 0.945640
- d. 0.946029
- e. 0.945875
- Unanswered

The time is 9:15

3. For a certain mortality table you are given

i) $\mu(81.5) = 0.0101$
ii) $\mu(82.5) = 0.0305$
iii) $\mu(83.5) = 0.0513$
iv) Death is uniformly distributed between integral ages.

Calculate the probability that a person age 81.5 will survive at least two years.

- a. 0.9791
- b. 0.9633
- c. 0.9410
- d. 0.9853
- e. 0.9909
- Unanswered

The time is 9:15

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4. Suppose that

$$f(x) = \frac{2(a-x)}{a^2}, \quad 0 \le x \le a$$

Find $\mu(x)$.

- a. $\frac{1}{a-x}$
- b. $\frac{2}{(a-x)^2}$
- c. $\frac{(a-x)^2}{a^2}$
- d. $\frac{1}{(a-x)^2}$
- e. $\frac{2}{a-x}$
- Unanswered

The time is 9:15

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5. You are given:

- ${}_t p_x = (0.8)^t, \quad t \ge 0$
- $l_{x+2} = 6.4$

Calculate T_{x+1}.

- a. 33.8
- b. 33.6
- c. 33.9
- d. 33.4
- e. 35.9
- Unanswered

The time is 9:15

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6. Suppose that $\mu_x = \frac{1}{97-x}, \quad 0 \le x \le 97$ and that the force of interest is $\delta = 0.06$.
The insurance policy pays 19 units of benefit at the moment of death. Find the variance of the present value of the benefit for a person aged 56 for an 10-year term life policy.

- a. 40.18
- b. 39.13
- c. 38.02
- d. 37.92
- e. 37.38
- Unanswered

The time is 9:15

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7. Suppose that $\mu_x = 0.01$ and that the force of interest is $\delta = 0.06$.
An insurance pays 17 units at the time of death. Find the Mean of the present value of the benefit for a whole life policy.

- a. 2.053
- b. 2.680
- c. 2.162
- d. 2.429
- e. 2.307
- Unanswered

The time is 9:15

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8. Suppose that $\mu_x = 0.01$ and that the force of interest is $\delta = 0.04$.
An insurance pays 11 units at the time of death. Find the variance of the present value of the benefit for a 9-year deferred whole life policy.

- a. 4.4580
- b. 4.0131
- c. 4.1509
- d. 3.1910
- e. 4.4040
- Unanswered

The time is 9:15

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9. Suppose that $\mu = 0.431$ and that the force of interest is $\delta = 0.569$.
For an individual of age (x), compute $(\overline{IA})^{1}_{x:\overline{5}|}$.

- a. 0.4136
- b. 0.3974
- c. 0.4475
- d. 0.4552
- e. 0.4482
- Unanswered

The time is 9:15

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10. Suppose that $v = 0.95$, $A_{x+1} = 0.49$, $(IA)_{x+1} = 10$, and $A_x = 0.54$.
Calculate $(IA)_x$.

- a. 8.766
- b. 9.322
- c. 8.579
- d. 7.613
- e. 9.543

- Unanswered

The time is 9:15

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11. You are given:

(i) ${}_9p_x = 0.8$
(ii) $\bar{a}_{x+9} = 10$
(iii) $\bar{a}_{x:\overline{9}|} = 7$
(iv) $i = 0.06$

Calculate $\bar{a}_x$.

- a. 11.735
- b. 13.415
- c. 10.295
- d. 10.157
- e. 13.247
- Unanswered

The time is 9:15

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12. Suppose $x = 38$ Suppose that T_x has the following pdf

$$f(t) = \begin{cases} 0.08e^{-0.08t}, & 0 \le t \le 10 \\ \dfrac{e^{-0.8}}{52} & 10 \le t \le 62 \end{cases}$$

Calculate the present value of a 10 year term annuity issued to (x) if $\delta = 0.05$ and one unit of annuity is paid continuously.

- a. 5.949
- b. 6.898
- c. 5.596
- d. 5.353

- e. 4.610
- Unanswered

The time is 9:15

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13. A government creates a fund to pay this year's lottery winners.
You are given

(i) There are 300 winners each age 35.
(ii) Each winner receives payments of 10 per year for life, payable annually, beginning immediately,
(iii) Mortality follows the illustrative life table at 6% .
(iv) The lifetimes are independent.
(v) The amount of F fund is determined, using the normal approximation, such that the probability that the fund is sufficient to make all payments is 95%.

Calculate F

- a. 46,988
- b. 46,863
- c. 46,683
- d. 46,417
- e. 46,548
- Unanswered

The time is 9:15

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14. Your age is 27 and you want to buy a three-year term life policy with a benefit of 200,000 payable at the end of year of death. Suppose that $i = 0.06$ and
$p_{27} = 0.94, \quad p_{28} = 0.92, \quad p_{29} = 0.89, \; p_{30} = 0.86.$
Find the standard deviation of the loss function.

- a. 78,749
- b. 79,876
- c. 77,081
- d. 78,095

- e. 78,483
- Unanswered

The time is 9:15

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15. On January 1, 2002, Pat age 40 purchases a 5-payment, 10-year term insurance of 300,000. Your are given:

(i) Death Benefits are payable at the moment of death.
(ii) Contract premiums of 12,000 are payable annually at the beginning of each year for 5 years.
(iii) $i = 0.05$.
(iv) L is the loss function at time of issue.

Calculate the value of L if Pat dies on June 30, 2004.

- a. 231,238
- b. 228,609
- c. 234,187
- d. 233,838
- e. 234,025
- Unanswered

The time is 9:15

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16. For a special fully discrete 34-payment whole life insurance on (31).
Your are given:

(i) Death Benefit is 1 for the first 18 years and is 5 thereafter.
(ii) The benefit premium is π for the first 18 years and 5π for each of the subsequent 16 years.
(iii) Mortality follows the illustrative life table at 6%.
Click here to see the table in a different window
(iv) $A_{31:\overline{18|}} = 0.36123$
(v) $\ddot{a}_{31:\overline{34|}} = 14.87$

Calculate π.

- a. 0.014
- b. 0.010
- c. 0.011
- d. 0.019
- e. 0.009
- Unanswered

The time is 9:15

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17. For a special fully discrete 2-year term insurance on (x).
Your are given:

(i) 0.9 is the lowest premium such that 0% chance of loss in year 1
(ii) $p_x = 0.71$
(iii) $p_{x+1} = 0.76$
(iv) Z is the random variable at issue of future benefits.

Calculate $E(Z^2)$.

- a. 0.342
- b. 0.356
- c. 0.347
- d. 0.355
- e. 0.354
- Unanswered

The time is 9:15

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18. For a fully continuous 21-year deferred life annuity of 1 issued to (30), You are given:

(i) Mortality follows de Moivre's law with $w = 76$
(ii) $i = 0$
(iii)Premium are paid continuously for 21 years.

Calculate the net premium reserve at the end of 10 years for this annuity.

- a. 4.294

- b. 4.774
- c. 4.874
- d. 4.344
- e. 4.934
- Unanswered

The time is 9:15

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19. For a special fully discrete whole life insurance of 1 is issued to (22), you are given:

(i) Premiums are paid annually to age 61.
(ii) Level benefit premiums are payable for life at the beginning of each year.
(iii) The net premium during the first *9* years is P followed by a different level annual premium for the next 30 years.
(iv) $A_{31} = 0.3$
(v) $P = 0.008$
(vi) $d = 0.06$

Calculate the reserve at the end of year *9*.

- a. 0.087
- b. 0.327
- c. 0.207
- d. 0.307
- e. 0.067
- Unanswered

The time is 9:15

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20. you are given:

(i) ${}_t\bar{k}_x = 0.28$
(ii) ${}_tE_x = 0.4$
(iii) $\bar{A}_{x+t} = 0.45$

Calculate ${}_t\bar{V}\left(\bar{A}_x\right)$.

- a. 0.053
- b. 0.393
- c. 0.033
- d. 0.343
- e. 0.223
- Unanswered

The time is 9:15

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21. The random variables $T(x)$ and $T(y)$ are independent. You are given the following mortality table:

k	q_{x+k}	q_{y+k}
0	0.09	0.11
1	0.10	0.16
2	0.11	0.21

Calculate $q_{x+k:y+k}$ for $k = 2$

- a. 0.317
- b. 0.262
- c. 0.297
- d. 0.309
- e. 0.270
- Unanswered

The time is 9:15

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22. The random variables $T(x)$ and $T(y)$ are independent. You are given the following mortality table:

k	q_{x+k}	q_{y+k}
0	0.07	0.09
1	0.08	0.12
2	0.09	0.20

Calculate ${}_{2|}q_{xy}$

- a. 0.206
- b. 0.158
- c. 0.214
- d. 0.186
- e. 0.205
- Unanswered

The time is 9:15

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23. For independent lives (35) and (45), you are given:

(i) ${}_{10}p_{35} = 0.87$
(ii) ${}_{10}p_{45} = 0.82$
(iii) ${}_{10}p_{55} = 0.77$
(iv) $p_{35} = 0.96$
(v) $p_{45} = 0.95$
(vi) $p_{55} = 0.94$

Calculate ${}_{10|}q_{35:45}$

- a. 0.0763
- b. 0.0774
- c. 0.0803
- d. 0.0725
- e. 0.0783
- Unanswered

The time is 9:15

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24. Suppose that people arrive at a desert island from either island *A* or island *B*.
The number of people arriving each day from island *A* is given by a Poisson distribution with parameter $\lambda_A = 6$.
The number of people arriving each day from island *B* is given by a Poisson distribution with parameter $\lambda_B = 5$.
What is the probability that 4 people arrive from island *A* before 3 people arrive from island *B*?

- a. 0.876
- b. 0.374
- c. 0.641
- d. 0.569
- e. 0.432
- Unanswered

The time is 9:15

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25. For a triple-decrement model, you are given the following information:

x	$q_x^{(1)}$	$q_x^{(2)}$	$q_x^{(3)}$
37	0.16	0.07	0.13
38	0.07	0.15	0.04
39	0.07	0.13	0.04
40	0.13	0.14	0.04
41	0.04	0.06	0.02
42	0.12	0.07	0.05

If $l_{37}^{(\tau)} = 1000$, compute

$$l_{42}^{(\tau)}$$

- a. 218.55
- b. 248.36
- c. 640.00
- d. 218.58
- e. 218.61
- Unanswered

The time is 9:15

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26. For a triple-decrement model, you are given the following information:

x	$q_x^{(1)}$	$q_x^{(2)}$	$q_x^{(3)}$
37	0.13	0.13	0.15
38	0.09	0.04	0.05
39	0.05	0.09	0.03
40	0.14	0.15	0.11
41	0.15	0.11	0.07
42	0.06	0.17	0.04

If $l_{37}^{(\tau)} = 1000$, compute

$$d_{41}^{(\tau)}$$

- a. 43.58
- b. 79.51
- c. 82.25
- d. 79.47
- e. 79.56
- Unanswered

The time is 9:15

27. For a triple-decrement model, you are given the following information:

x	$q'^{(1)}_x$	$q'^{(2)}_x$	$q'^{(3)}_x$
37	0.14	0.07	0.07
38	0.15	0.11	0.11
39	0.04	0.08	0.06
40	0.12	0.13	0.04
41	0.07	0.12	0.15
42	0.13	0.02	0.09

Calculate ${}_{3|3}q_{37}^{(\tau)}$.

- a. 0.348
- b. 0.215
- c. 0.251
- d. 0.200
- e. 0.167
- Unanswered

The time is 9:15

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28. A population is subject to 2 decrements, death (1), and withdrawal (2). You are given:

(i) Death are uniformly distributed over each year of age in single decrement table.
(ii) Withdrawal occurs at the end of each year.
(iii) $l_x^{(\tau)} = 1000$
(iv) $q_x^{(2)} = 0.44$
(v) $d_x^{(1)} = (0.50)d_x^{(2)}$

Calculate $p'^{(2)}_x$

- a. 0.52
- b. 0.47
- c. 0.44
- d. 0.51
- e. 0.37
- Unanswered

The time is 9:15

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29. For a perpetuity-immediate with annual payments of 1:

(i) The sequence of annual discount factors follows a Markov chain with the following three states:

State Number	0	1	2

Annual Discount Factor v	0.94	0.93	0.92

(ii) The transition matrix for the annual discount factors is:

$$Q = \begin{bmatrix} .0 & 1.0 & .0 \\ 0.7 & 0.0 & 0.3 \\ .0 & 1.0 & .0 \end{bmatrix}$$

(iii) Y is the present value of the perpetuity payments when the initial state is 1.

Calculate $E(Y)$

- a. 12.61
- b. 12.48
- c. 13.69
- d. 14.89
- e. 14.45
- Unanswered

The time is 9:15

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30. For a fully continuous whole life insurance of 1 on (x), you are given:

(i) $\delta = 0.04$
(ii) $\overline{a}_x = 11$
(iii) $\text{Var}\left(v^T\right) = 0.12$
(iv) ${}_0L_e = {}_0L + E$ is the expense augmented loss variable, where

$$\begin{aligned} {}_0L &= v^T - \overline{P}\left(\overline{A}_x\right)\overline{a}_{\overline{T}|} \\ E &= c_0 + (g - e)\overline{a}_{\overline{T}|} \\ c_0 &= \text{initial expense} \\ g &= 0.0026 \quad \text{is the annual rate of continuous maintenance expense} \\ e &= 0.0052 \quad \text{is the annual expense loading premium} \end{aligned}$$

Calculate $\text{Var}({}_0L_e)$

- a. 0.666
- b. 0.656
- c. 0.537
- d. 0.813
- e. 0.475
- Unanswered

The time is 9:15

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