1. 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 $s(35)$.

- a. 0.976680
- b. 0.976121
- c. 0.976141
- d. 0.976383
- e. 0.977140
- Unanswered

The time is 8:51

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 ${}_{79}d_{9}$.

- a. 80510.2
- b. 80495.7
- c. 80484.9
- d. 80482.5
- e. 80482.1
- Unanswered

The time is 8:51

3. Suppose that $\mu_x = 0.01$ and that the force of interest is $\delta = 0.05$.
An insurance pays 19 units at the time of death. Find the mean of the present value of the benefit for a 8-year deferred whole life policy.

- a. 2.2084
- b. 1.4092

- c. 1.9595
- d. 2.1632
- e. 2.4454
- Unanswered

The time is 8:51

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4. In this problem, we use the illustrative life table at 6% .
Find $\ddot{a}_{31}^{(5)}$ given that $\alpha(5) = 1.0002717$ and $\beta(5) = 0.4094604$.

- a. 15.34
- b. 15.33
- c. 15.39
- d. 15.37
- e. 15.41
- Unanswered

The time is 8:51

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5. For a special fully discrete 36-payment whole life insurance on (33).
Your are given:

(i) Death Benefit is 1 for the first 19 years and is 5 thereafter.
(ii) The benefit premium is π for the first 19 years and 5π for each of the subsequent 17 years.
(iii) Mortality follows the illustrative life table at 6%.
Click here to see the table in a different window
(iv) $A_{33:\overline{19}|} = 0.33714$
(v) $\ddot{a}_{33:\overline{36}|} = 14.789$

Calculate π.

- a. 0.013
- b. 0.021
- c. 0.020
- d. 0.018

- e. 0.023
- Unanswered

The time is 8:51

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6. A whole life insurance on (11) pays 5000 at the end of year of death. Premiums are paid annually at the beginning of the year up to age 67. The net premium for the first 15 years is 5000P~~15~~ 11 followed by 5000 P for the remaining 41 years. You are given:

(i) $A_{11} = 0.04$
(ii) $A_{26} = 0.08$
(iii) $\ddot{a}_{11} = 14$
(iv) $\ddot{a}_{11:\overline{15}|} = 9$
(v) $\ddot{a}_{11:\overline{56}|} = 14$
(vi) $\ddot{a}_{26:\overline{41}|} = 12.69$

At the end of 15 years, the policyholder has the option to continue with the net premium $5000P_{11}$ until age 67 in return for a reduction of death benefit to B for death after age 26. Calculate B

- a. 4985.51
- b. 4751.76
- c. 4870.21
- d. 4754.11
- e. 4980.51
- Unanswered

The time is 8:51

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7. You are given:

$$\sum_{x=36}^{47} \ln(1 - {}_1V_x) = \ln \frac{7}{14}$$

Compute ${}_{12}V_{36}$.

- a. 0.5000
- b. 0.5376
- c. 0.4767
- d. 0.5103
- e. 0.5260
- Unanswered

The time is 8:51

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8. You are given:

(i) ${}_tV_x = 0.1$
(2) ${}_tV_{x+t} = 0.2$

Calculate ${}_{2t}V_x$.

- a. 0.4034
- b. 0.4101
- c. 0.4084
- d. 0.2800
- e. 0.3935
- Unanswered

The time is 8:51

---

9. For a fully discrete life insurance on (x) with premiums determined by the equivalence principle, you are given:

(i) $i = 0.06$
(ii)

k	$\ddot{a}_{x+k}$	A_{x+k}	P_{x+k}	${}_kV_x$	${}^2A_{x+k}$
0					
5	11.382	0.35575			
10	10.154	0.42522			0.22334
15			0.05654	0.29209	
20	7.486			0.40040	

(iii) ${}_kL$ is the random variable for the prospective loss at time k.

Calculate P_x

- a. 0.02349
- b. 0.02208
- c. 0.02491
- d. 0.02196
- e. 0.02516
- Unanswered

The time is 8:51

---

10. For a fully discrete life insurance on (x) with premiums determined by the equivalence principle, you are given:

(i) $i = 0.06$
(ii)

k	$\ddot{a}_{x+k}$	A_{x+k}	P_{x+k}	${}_kV_x$	${}^2A_{x+k}$
0					
5	13.448	0.23882			
10	12.486	0.29327			0.12267
15			0.03126	0.20206	
20	10.154			0.28810	

(iv) You might not need all what is given in the table above to do the problem
(iv) ${}_kL$ is the random variable for the prospective loss at time k.

Calculate $\ddot{a}_{x+15}$

- a. 10.917
- b. 11.566
- c. 11.522
- d. 11.381
- e. 10.945
- Unanswered

The time is 8:51

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11. You are given three mortality assumptions: You are given:

(i) (ILT) Illustrative Life Table at 6%
Click here to see the table in a different window
(ii) (CF) Constant force model, where $s(x) = e^{-\mu x}$
(iii) (DM) De Moivre's models, where $s(x) = 1 - \frac{x}{\omega}, \quad 0 \le x \le \omega, \quad \omega > 68$

You also know that ${}_2p_{66}$ is the same for all three mortality assumptions.
Rank $e_{66:\overline{2}|}$ for the three models.

- a. CF < DM < ILT
- b. ILT < CF < DM
- c. ILT < DM < CF
- d. DM < CF < ILT
- e. DM < ILT < CF
- Unanswered

The time is 8:51

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12. You are given:

(i) ${}_kV^A$ is the benefit reserve at the end of year k for a type A insurance, which is fully discrete 10-payment whole life insurance of 2000 on (x).
(ii) ${}_kV^B$ is the benefit reserve at the end of year k for a type B insurance, which is fully discrete whole life insurance of 2000 on (x).
(iii) $q_{x+10} = 0.004$
(iv) ${}_{10}V^A - {}_{10}V^B = 101.36$
(v) $i = 0.06$
(vi) The annual benefit premium for type B insurance is 8.24

Calculate ${}_{11}V^A - {}_{11}V^B$

- a. 101
- b. 100
- c. 104
- d. 99

- e. 98
- Unanswered

The time is 8:51

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13. You are given:

(i) Lives (25) and (50) are independent.
(ii) The force of mortality for (25) is $\mu_x^1 = 0.04$
(iii) The force of mortality for (50) is $\mu_x^2 = 0.08$

Calculate the probability that both lives survive 15 years.

- a. 0.249
- b. 0.256
- c. 0.248
- d. 0.254
- e. 0.165
- Unanswered

The time is 8:51

---

14. 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. 0.297
- b. 0.263
- c. 0.261
- d. 0.264
- e. 0.277

Unanswered

The time is 8:51

---

15. For two independent lives (44) and (54), you are given:

(i) ${}_5p_{44} = 0.86$
(ii) ${}_5p_{54} = 0.76$
(iii) $q_{49} = 0.03$
(iv) $q_{59} = 0.05$

Calculate ${}_{5|}q_{\overline{44:54}}$

- a. 0.0085
- b. 0.0092
- c. 0.0174
- d. 0.0151
- e. 0.0125
- Unanswered

The time is 8:51

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16. Mortality rates for two lives (x) and (y) are as follows:

t	q_{x+t}	q_{y+t}
0	0.008	0.015
1	0.018	0.026
2	0.026	0.036

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

- a. 0.0533
- b. 0.0605
- c. 0.0527
- d. 0.0571
- e. 0.0557
- Unanswered

The time is 8:51

17. For a last survivor insurance of 30,000 on independent lives (69) and (77), you are given:

(i) The benefit, payable at the end of year of death, if paid only if the second death occurs during year *6*
(ii) Mortality follows the Illustrative Life Table.
Click here to see the table in a different window
(iii) $i = 0.05$

Calculate the APV of this insurance.

- a. 626
- b. 546
- c. 586
- d. 606
- e. 576
- Unanswered

The time is 8:51

18. You are given that (82) and (82) are independent and their mortality follows De Moivre's Law with $\omega = 95$.
Calculate the probability that the last survivor die between ages 88 and 89.

- a. 0.09
- b. 0.04
- c. 0.10
- d. 0.07
- e. 0.08
- Unanswered

The time is 8:51

19. A fully continuous insurnace policy is issued to (x) and (y).
A death benefit of 30,000 is payable upon the second death.

The premium is payable continuously until the last death. The rate of the annual premimium is K while (x) is alive and reduces to $.5K$ upon the death of (x) if (x) dies before (y). You are given:

(i) $\delta = 0.05$
(ii) $\bar{a}_x = 13$
(iii) $\bar{a}_y = 17$
(iV) $\bar{a}_{xy} = 11$

Calculate K.

- a. 91.36
- b. 99.84
- c. 93.75
- d. 88.85
- e. 91.42
- Unanswered

The time is 8:51

---

20. For two independent lives (65) and (73).
You are given

(i) The survival function of (65) follows De Moivre's law with $\omega = 85$.
(ii) The survival function of (73) follows De Moivre's law with $\omega = 88$.

Calculate the probability that (65) dies after (7) years but after (73) dies.

- a. 0.457
- b. 0.523
- c. 0.543
- d. 0.477
- e. 0.633
- Unanswered

The time is 8:51

21. For perpetuity-immediate with annual payments of 1, you are given the following:

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

State number	0	1	2
Annual Discount Factor v	0.95	0.94	0.93

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

$$Q = \begin{pmatrix} 0.00 & 1.00 & 0.00 \\ 0.75 & 0 & 0.25 \\ 0.00 & 1.00 & 0.00 \end{pmatrix}$$

Y is the present value of the perpetuity payments when the initial State is 1. Compute $E(Y)$.

- a. 16.45
- b. 16.91
- c. 17.00
- d. 17.10
- e. 16.37
- Unanswered

The time is 8:51

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

x	$q_x^{(1)}$	$q_x^{(2)}$	$q_x^{(3)}$
37	0.10	0.05	0.04
38	0.03	0.16	0.11
39	0.17	0.16	0.05
40	0.03	0.11	0.13
41	0.07	0.02	0.16
42	0.15	0.09	0.08

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

$$d_{40}^{(\tau)}$$

- a. 243.00
- b. 94.92
- c. 215.46
- d. 94.84
- e. 94.85
- Unanswered

The time is 8:51

---

23. In a double-decrement table, you are given the following information:

(i) $l_{37}^{(\tau)} = 9{,}000, \quad l_{39}^{(\tau)} = 3{,}888$

(ii) $q'^{(1)}_{37} = 0.1, \quad q'^{(2)}_{37} = 0.2$

(iii) ${}_{1|}q_{37}^{(1)} = 0.05$

Calculate $q_{38}^{(2)}$.

- a. 0.361
- b. 0.406
- c. 0.331
- d. 0.428
- e. 0.313
- Unanswered

The time is 8:51

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

x	$q'^{(1)}_x$	$q'^{(2)}_x$	$q'^{(3)}_x$

37	0.15	0.14	0.09
38	0.16	0.02	0.04
39	0.03	0.03	0.06
40	0.10	0.02	0.04
41	0.03	0.08	0.06
42	0.16	0.03	0.02

Calculate ${}_3p_{39}^{(\tau)}$.

- a. 0.653
- b. 0.700
- c. 0.628
- d. 0.600
- e. 0.672
- Unanswered

The time is 8:51

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25. For special whole life insurance, you are given:

(i) Benefits are payable at the the moment of death.
(ii)The benefit for accidental death (Cause (1)) is 0 for all years.
(iii) The benefit for non-accidental death (Cause (2)) for the first *3* years is return of the single benefit premium *P* without interest.
(iv) The benefit for non-accidental death after the first *3* years is 35,000
(v) $\mu^{(1}(t) = 0.058, \quad t \geq 0$
(vi) $\mu^{(2)}(t) = 0.022, \quad t \geq 0$
(vii) $\delta = 0.05$

Calculate *P*.

- a. 4,200
- b. 3,800
- c. 4,600

- d. 3,900
- e. 4,000
- Unanswered

The time is 8:51

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26. Harold has been disabled and will begin receiving disabilty payments.
You are given:

(i) $v = 0.90$
(ii)The benefit for accidental death (Cause (1)) is 0 for all years.
(iii) $\mu_{65}^{(1}(t) = .1(5 - t), \quad t \le 5$
(iv) $\mu_{65}^{(2)}(t) = .1t, \quad t \le 5$
(v) Payments of 10,000 begin today, his 65th birthday.
(vi) On every birthdays up to and including his 70th birthday, he will receive 10,000 as long as he has not recovered or died.

Calculate the APV of Harold's disability payments.

- a. 20,953
- b. 18,858
- c. 19,294
- d. 21,438
- e. 21,198
- Unanswered

The time is 8:51

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27. A non-homogenous Markov model has:

(i) Three states: 0, 1, and 2
(ii) Annual transition matrix Q_n are as follows:

$$Q_n = \begin{pmatrix} 0.82 & 0.18 & 0 \\ 0.11 & 0.73 & 0.16 \\ 0 & 0 & 1 \end{pmatrix} \qquad \text{for} \quad n = 0,\ 1,\ 2$$

$$Q_n = \begin{pmatrix} 0.95 & 0.05 & 0 \\ 0.5 & 0.5 & 0 \\ 0 & 0 & 1 \end{pmatrix} \qquad \text{for} \quad n = 3,\ 4,\ 5,\ 6\ldots$$

An individual starts out in state 0, what is the probabilty that this individual will ever be in state 2?

- a. 0.155
- b. 0.008
- c. 0.268
- d. 0.130
- e. 0.073
- Unanswered

The time is 8:51

---

28. For two indpendent lives (46) and (60) you are given:

(i) $\delta = 0.04$
(ii) Mortality for both lives follows De Moivre's law with $\omega = 95$

Compute $\bar{a}_{46:60}$

- a. 11.263
- b. 9.374
- c. 10.182
- d. 8.300
- e. 7.403
- Unanswered

The time is 8:51

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29. The force of mortality is *2* times the force of mortality given by the Illustrative life table.
Click here to see the table in a different window

Compute ${}_{14}p_{36}$

- a. 0.9630172
- b. 0.8552496
- c. 0.9621102
- d. 0.9742340
- e. 0.9064043
- Unanswered

The time is 8:51

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30. For a fully discrete insurance of 1000, you are given:

1. The per premium expense is 12% for every year.
2. The Per 1000 is *4* for every year.
3. $A_x = 0.27$
4. ${}^2A_x = 0.14$
5. $i = 0.03$
6. ${}_0L_e$ is the expense loaded loss at issue random variable.
7. The contract premium and the expense-loaded premium are determined by the equivalenc principal.

Calculate $\mathrm{Var}({}_0L^e)$.

- a. 121,300
- b. 125,900
- c. 121,500
- d. 133,600
- e. 119,000
- Unanswered

The time is 8:51

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