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 $s(72)$.

- a. 0.709296
- b. 0.709503
- c. 0.710192
- d. 0.710624
- e. 0.710738
- Unanswered

The time is 9:36

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 ${}_{56|12}q_5$.

- a. 0.086304
- b. 0.299904
- c. 0.195404
- d. -0.001496
- e. 0.334504
- Unanswered

The time is 9:36

3. Suppose that

$$s(x) = 1 - \frac{x^2}{196}, \quad 0 \le x \le 14$$

Find the density function of $T(6)$.

- a. $\frac{t+6}{196}$
- b. $\frac{t^2+6}{80}$
- c. $\frac{t+6}{80}$
- d. $\frac{t-6}{80}$
- e. $\frac{t^2-6}{80}$
- Unanswered

The time is 9:36

4. Suppose that

$$f(x) = \frac{2(15-x)}{225}, \quad 0 \le x \le 15$$

Find $\mu(13)$.

- a. 1.00
- b. 1.04
- c. 0.95
- d. 1.06
- e. 1.03
- Unanswered

The time is 9:36

5. Suppose that

$$A^{1}_{x:\overline{28|}} = 0.18, \quad A_{x+28} = 0.22, \text{ and } A_{x:\frac{1}{28|}} = 0.65$$

Find A_x.

- a. 0.38
- b. 0.29
- c. 0.27
- d. 0.32
- e. 0.35
- Unanswered

The time is 9:36

6. For an insurance of 1000 on (37), you are given:

1. $p_{48} = 0.94$
2. $v = 0.95$
3. $1000 \ {}_{12}V_{37} = 264$

Compute $\mathrm{Var}[\Lambda_{11} | K(37) \ge 11]$.

- a. 27,573
- b. 26,873

- c. 27,773
- d. 28,073
- e. 28,273
- Unanswered

The time is 9:36

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7. A decreasing life insurance on (74) pays $(26-k)$ if (74) dies in year $k+1$ for $k=1,\ 2,\ \ldots 25$

(i) $i=0.07$
(ii) For a certain mortality table with $q_{74}=0.2$, the actuarial present value of this insurance is 14.
(iii) For this same mortality table except that $q_{74}=0.1$, the actuarial present value of this insurance is P.

Calculate P.

- a. 12.6
- b. 12.7
- c. 13.1
- d. 12.8
- e. 12.3
- Unanswered

The time is 9:36

---

8. You are given:

(i) $q_x=0.11$
(ii) $q_{x+1}=0.16$
(iii) $i=0.1$
(iv) Deaths are uniformly distributed over each year of a age.

Calculate ${}^2\bar{A}^{1}_{x:\overline{2}|}$.

- a. 0.292
- b. 0.303
- c. 0.301
- d. 0.207
- e. 0.276
- Unanswered

The time is 9:36

9. Your age is 25 and you want to buy a 4-year term life policy with a benefit of 200,000 payable at the end of year of death. Suppose that $i = 0.05$ and
$p_{25} = 0.94, \quad p_{26} = 0.92, \quad p_{27} = 0.89, \ p_{28} = 0.86.$
Find the equivalence premium of this insurance.

- a. 17,542
- b. 17,711
- c. 17,869
- d. 17,824
- e. 17,891
- Unanswered

The time is 9:36

10. You are given:

(ii) Mortality follows the illustrative life table at 6%.
Click here to see the table in a different window
(ii) Assume UDD over the year of death.

Find $P(\overline{A}_{63})$.

- a. 0.04065
- b. 0.05119
- c. 0.03024
- d. 0.05160
- e. 0.03058
- Unanswered

The time is 9:36

11. On January 1, 2002, Pat age 40 purchases a 5-payment, 10-year term insurance of 200,000. Your are given:

(i) Death Benefits are payable at the moment of death.
(ii) Contract premiums of 8,000 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, 2003.

- a. 167,475

- b. 167,927
- c. 172,991
- d. 172,815
- e. 170,267
- Unanswered

The time is 9:36

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12. A fully discrete 3-year endowment insurance is issued to (x). You are given:

(i) $i = 0.06$
(ii)

y	l_y
x	3000
$x+1$	2700
$x+2$	2430

(iii) $6000P_{x:\overline{3}|} = 1995.06$

Compute $6000\,{}_2V_{x:\overline{3}|}$

- a. 3665
- b. 3570
- c. 3725
- d. 3745
- e. 3655
- Unanswered

The time is 9:36

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13. For a special fully discrete whole life insurance of 1 is issued to (23), you are given:

(i) Premiums are paid annually to age 62.
(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 33 years.
(iv) $A_{32} = 0.3$
(v) $P = 0.008$
(vi) $d = 0.06$

Calculate the reserve at the end of year 9.

- a. 0.307
- b. 0.327

- c. 0.077
- d. 0.207
- e. 0.347
- Unanswered

The time is 9:36

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14. For a portfolio of 1200 insurances, you are given

(i) Each insurance is a fully discrete 5-year term insurance on (50).
(ii) Premiums are determined using the equivalence principle.
(iii) The composition of the portfolio on January 1, 1997 is as follows:

Issue Date	Number	Face Amount
January 1, 1996	300	3000
January 1, 1995	300	1000
January 1, 1994	400	3000
January 1, 1994	200	2000

(iv) ${}_kL$ is the prospective loss random variable for 5-year term insurance of 1000 on (50).
(v)

k	$1000\ {}_kV^{1}_{50:\overline{5}\vert}$	$\mathrm{Var}[{}_kL \vert K(50) \geq k]$
1	1.04	21,366
2	1.62	17,715
3	1.7	13,012

(vi) The losses are independent.

Using the normal approximation, calculate the amount as of January 1, 1997 which will give the insurer a probability of .99 of meeting the future obligations on this block of business.

- a. 31,154
- b. 29,649
- c. 24,654
- d. 34,094
- e. 31,054
- Unanswered

The time is 9:36

---

15. 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	0.14
2	0.09	0.19

Calculate $q_{x+k:y+k}$ for $k = 0$

- a. 0.135
- b. 0.079
- c. 0.124
- d. 0.203
- e. 0.155
- Unanswered

The time is 9:36

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16. For two independent lives (46) and (55), you are given

(i) The mortality of (46) follows DeMoivre's Law with $\omega = 106$
(ii) The mortality of (55) follows DeMoivre's Law with $\omega = 103$

Calculate $\mathring{e}_{\overline{55:46}}$.

- a. 34.99
- b. 36.40
- c. 34.81
- d. 37.55
- e. 34.61
- Unanswered

The time is 9:36

---

17. Two independent lives (x) and (y) purchased a continuous annuity of 20,000 per year as long as one of them survives. You are given:

(i) $\delta = 0.05$
(ii) $\mu_x(t) = 0.058$ for all x and t
(iii) $\mu_y(t) = 0.048$ for all y and t

Calculate the APV of this annuity

- a. 261,100
- b. 261,000

- c. 260,300
- d. 261,800
- e. 262,000
- Unanswered

The time is 9:36

---

18. For two independent lives (67) and (76).
You are given

(i) The survival function of (67) follows De Moivre's law with $\omega = 88$.
(ii) The survival function of (76) follows De Moivre's law with $\omega = 92$.

Calculate the probability that both (67) and (76) will will survive at least *8* years.

- a. 0.310
- b. 0.690
- c. 0.612
- d. 0.388
- e. 0.376
- Unanswered

The time is 9:36

---

19. Let Q be a transition probabilty matrix for a homogeneous Markov chain.

$$Q = \begin{pmatrix} 0.09 & 0.16 & 0.75 \\ 0.16 & 0.18 & 0.66 \\ 0.30 & 0.07 & 0.63 \end{pmatrix}$$

This matrix describes the probabilites of transition between three States S_0, S_1 and S_2.
If a person is in S_2 now, what is the probabiliy that he will stay in S_2 two periods from now?

- a. 0.2272
- b. 0.6681
- c. 0.1047
- d. 0.6532
- e. 0.7177
- Unanswered

The time is 9:36

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20. The Simple Insurance Company starts at time t=0 with a surplus of $S = 3$. You are given the following:

(i) At the beginning of each year, it collects a premium of $P = 2$
(ii) Every year, it pays one random claim amount according to the table

Claim Amount	Probabilty of Claim Amount
0	0.12
1	0.21
2	0.45
4	0.22

(iii) Claim Amounts are mutually independent.
(iv) If at the end of the year Simple's surplus is more than 3, it pays dividens to the amount of surplus in excess of 3
(v) If Simple is unable to pay its claim, or if surplus drops to zero, then it goes out of business,
(vi) Simple has no administrative expenses and its interest $i = 0$.

Calculate the expected dividend at the end of the third year.

- a. 0.291
- b. 0.573
- c. 0.464
- d. 0.401
- e. 0.553
- Unanswered

The time is 9:36

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

x	$q_x^{(1)}$	$q_x^{(2)}$	$q_x^{(3)}$
37	0.03	0.02	0.06
38	0.15	0.06	0.02
39	0.13	0.11	0.06
40	0.04	0.04	0.13
41	0.07	0.14	0.14
42	0.08	0.14	0.05

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

$$d_{40}^{(I)}$$

- a. 133.50
- b. 19.71
- c. 19.19
- d. 19.28
- e. 19.29
- Unanswered

The time is 9:36

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

x	$q_x^{(1)}$	$q_x^{(2)}$	$q_x^{(3)}$
37	0.15	0.05	0.15
38	0.05	0.08	0.10
39	0.03	0.16	0.02
40	0.07	0.10	0.11
41	0.15	0.08	0.06
42	0.15	0.15	0.14

Calculate $\mu_{41}^{(2)}(0.14)$, assumming uniform distribution of decrements on the interval $(41,\ 41+1)$.

- a. 0.068
- b. 0.058
- c. 0.083
- d. 0.066
- e. 0.007
- Unanswered

The time is 9:36

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

x	$q_x^{(1)}$	$q_x^{(2)}$	$q'^{(1)}_x$	$q'^{(2)}_x$
36	0.23	0.08	-	y
37	-	-	0.16	$2y$

Assume that each decrement is uniformly distributed over each year of age in the double-decrement table.
If $l_{36}^{(\tau)} = 2{,}200$, Calculate $l_{38}^{(\tau)}$.

- a. 1,000
- b. 1,080
- c. 1,010
- d. 1,070
- e. 1,040
- Unanswered

The time is 9:36

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24. You are given the following information about $q_x^{(j)}$

(i) In a double decrement model:
(a) $j = 1$ if the cause of death is beri-beri.
(b) $j = 2$ if the cause of death is other than beri-beri.
(ii) $q_x^{(\tau)} = \frac{x}{100}$
(iii) $q_x^{(1)} = \frac{1}{2} q_x^{(1)}$

Calculate the probability that an individual age 45 will die from Beri-Beri within 3 years.

- a. 0.319
- b. 0.232
- c. 0.184
- d. 0.281
- e. 0.191
- Unanswered

The time is 9:36

---

25. A population of 3000 lives age 60 is subject to 3 decrements, death (1), disability (2), and retirement (3). You are given:

(i)

x	$q'^{(1)}_x$	$q'^{(2)}_x$	$q'^{(3)}_x$
60	0.010	0.030	0.090
61	0.013	0.052	0.208

(ii) Decrements are uniformly distributed over each age in the multiple decrement table.

Calculate the expected number of people who will retire before age 62

- a. 703
- b. 793

- c. 833
- d. 733
- e. 803
- Unanswered

The time is 9:36

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26. For a triple decrement model you are given the following about a person age (x)

(i) $\mu_x^{(1)}(t) = 0.01, \quad t \geq 0$
(ii) $\mu_x^{(2)}(t) = 0.03 \quad t \geq 0$
(iii) $\mu_x^{(3)}(t) = 0.04 \quad t \geq 0$

Where the index (1) indicates death, the index (2) indicates withdrawal for disability and the index (3) indicates withdrawal for all other causes.
Find the probability that (x) will withdraw for all other causes.

- a. 0.500
- b. 0.375
- c. 0.125
- d. 0.417
- e. 0.413
- Unanswered

The time is 9:36

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27. 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 80,000 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 40,000
(v) $\mu^{(1}(t) = 0.01, \quad t \geq 0$
(vi) $\mu^{(2)}(t) = 2.71, \quad t \geq 0$
(vii) $\delta = 0.06$

Calculate P.

- a. 11,500
- b. 12,000
- c. 11,300
- d. 11,400

- e. 11,700
- Unanswered

The time is 9:36

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28. You are given:

(i) $T(x)$ and $T(y)$ are independent.
(ii) Deaths of (x) and (y) are uniformly distrbuted over each year of age.
(iii) $q_x = 0.7$
(iv) $q_y = 0.8$

Compute ${}_{0.29}q^{\;2}_{x+0.4:y+0.4}$.

- a. 0.0481
- b. 0.0149
- c. 0.0698
- d. 0.0175
- e. 0.0319
- Unanswered

The time is 9:36

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29. You are given:

(i) x and (y) are independent lives.
(ii) $\mu_x(t) = 7t, \quad t \geq 0$
(iii) $\mu_y(t) = 3t, \quad t \geq 0$

Compute $q_{x:\overset{1}{y}}$.

- a. 0.70
- b. 0.18
- c. 0.09
- d. 0.30
- e. 0.11
- Unanswered

The time is 9:36

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30. For a semi-continuous 20-year endowment insurance of 25,000 on (x), you are given:

(i) Expenses are paid at the beginning of the year and are as follows:

Year	% of Premium Expenses	Per 1000 expenses	Per Policy expenses

1	22 %	*2*	18
Renewal	*7* %	0.43	*4*

(ii) Deaths are uniformly distributed over each year of age.
(iii) $\bar{A}_{x:\overline{20}|} = 0.4058$
(iv) $A_{\substack{\ \ 1\\x:\overline{20}|}} = 0.3195$
(v) $\ddot{a}_{x:\overline{20}|} = 12.522$
(vi) $i = 0.05$
(vii) Premiums are determined using the equivalence principle.

Calculate the expense-loaded **first year** premium including policy fee assuming that per-policy expenses are matched separately by first year and renewal policy fees.

- a. 921
- b. 898
- c. 931
- d. 909
- e. 927
- Unanswered

The time is 9:36

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