1. Suppose that the survival function is given by

$$s(x) = \frac{100 - x}{100}$$

Compute ${}_{19}p_{39}$

- a. $\frac{41}{61}$
- b. $\frac{43}{61}$
- c. $\frac{40}{61}$
- d. $\frac{42}{61}$
- e. $\frac{44}{61}$
- Unanswered

The time is 8:41

2. Suppose that the survival function is given by

$$s(x) = \left(1 - \frac{x}{106}\right)^{\frac{1}{4}}, \quad 0 \le x \le 106.$$

Compute the force of mortality at age $x$.

- a. $\frac{4}{(106-x)}$
- b. $\frac{1}{(106-x)}$
- c. $\frac{106}{4(106-x)}$
- d. $\frac{106-x}{4}$
- e. $\frac{1}{4(106-x)}$

- Unanswered

The time is 8:41

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3. 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 ${}_{74}d_6$.

- a. 52232.7
- b. 52230.1
- c. 52248.5
- d. 52228.9
- e. 52258.8
- Unanswered

The time is 8:41

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4. For a certain mortality table you are given

i) $\mu(75.5) = 0.0101$
ii) $\mu(76.5) = 0.0305$
iii) $\mu(77.5) = 0.0513$
iv) Death is uniformly distributed between integral ages.

Calculate the probability that a person age 75.5 will survive at least two years.

- a. 0.8998
- b. 0.9410
- c. 0.9169
- d. 0.9099
- e. 0.8915
- Unanswered

The time is 8:41

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5. Suppose that

$$s(x) = 1 - \frac{x^2}{256}, \quad 0 \le x \le 16$$

Find the density function of $T(4)$.

- a. $\frac{t+4}{256}$
- b. $\frac{t^2+4}{120}$
- c. $\frac{t-4}{120}$
- d. $\frac{t+4}{120}$
- e. $\frac{t^2-4}{120}$
- Unanswered

The time is 8:41

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6. For a loss distribution, where $x \ge 2$, you are given:

i) The hazard rate function (mortality rate) is $\mu(x) = \frac{u}{2x}$ for $x \ge 2, \quad u > 0$
ii) A value of the distribution $F(4) = 0.78$.

Calculate $u$.

- a. 4.369
- b. 4.115
- c. 4.089
- d. 3.882
- e. 4.263
- Unanswered

The time is 8:41

---

7. 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 Variance of the present value of the benefit for a whole life policy.

- a. 22.002
- b. 22.790
- c. 23.584
- d. 22.610
- e. 22.287
- Unanswered

The time is 8:41

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8. Suppose that $\mu_x = \frac{1}{101-x}, \quad 0 \le x \le 101$ and that the force of interest is $\delta = 0.05$.
The insurance policy pays 11 units of benefit at the moment of death. Find the mean of the present value of the benefit for a person aged 46 for an $8$-year pure endowment policy.

- a. 6.914
- b. 6.662
- c. 6.301
- d. 6.592
- e. 6.666
- Unanswered

The time is 8:41

---

9. Lee age (50), considers the purchase of a single premium whole life insurnace of 12,000 with death benefit payable at the end of the year of death.
The company calculates benefit premiums using:

(i) Mortality are based on the following table
Click here to see the table in a different window
(ii) $i = 0.05$

The company calculates contract premium as 112% of benefit premiums.
The single contract premium at age is 5144.
Lee decides to delay for two years and invests the 5144.

Calculate the minimum annual of return that the investment must earn to accumulate to an amount equal to the single contract premium at age 52.

- a. 0.032
- b. 0.044
- c. 0.027
- d. 0.051
- e. 0.063
- Unanswered

The time is 8:41

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10. Your age is 25 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 $i = 0.05$ and
$p_{25} = 0.95, \quad p_{26} = 0.93, \quad p_{27} = 0.9, \ p_{28} = 0.87.$
Find the standard deviation of the loss function.

- a. 78,214
- b. 78,139
- c. 77,109
- d. 74,528
- e. 74,395
- Unanswered

The time is 8:41

---

11. Your stated age is 26 and you want to buy a fully discrete three-year term life policy with a benefit of 200,000 payable at the end of year of death. Suppose that $i = 0.05$ and
$p_{26} = 0.95, \quad p_{27} = 0.93, \quad p_{28} = 0.9, \ p_{29} = 0.87.$
The insurance company discovered your age at issue was really 27. Using the equivalence principle, the insurance company adjusted the death benefit to the level benefit it should have been at issue, given the premium charged.
Compute the adjusted death benefit.

- a. 146,888

- b. 146,862
- c. 146,829
- d. 147,002
- e. 147,194
- Unanswered

The time is 8:41

---

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

(i) $P$ is the benefit premium.
(ii) $L$ is the loss-at-issue random variable with the premium equal to $P$.
(iii) $L^*$ is the loss-at-issue random variable with the premium equal to 1.2 $P$.
(iv) $\bar{a}_x = 4$
(v) $\delta = 0.074$
(vi) $\text{Var}(L) = 0.5246$

Calculate $E(L^*) + \sqrt{\text{Var}(L^*)}$.

- a. 0.6855
- b. 0.7015
- c. 0.6971
- d. 0.6721
- e. 0.6987
- Unanswered

The time is 8:41

---

13. For a fully discrete whole life insurance of 3000 on (48), you are given:

(i) $i = 0.05$
(ii) $3000P_{48} = 27$
(iii) $3000A_{59} = 430$
(iv) $3000q_{58} = 18$

Calculate $3000\ {}_{10}V_{48}$.

- a. -59
- b. -65
- c. -63
- d. -71
- e. -67
- Unanswered

The time is 8:41

---

14. You are given the following table of life annuity values:

| $x$ | $\bar{a}_x$ |
|---|---|
| 29 | 13 |
| 30 | 12.5 |
| 31 | 12 |
| 32 | 11.5 |
| 33 | 11 |
| 34 | 10.5 |
| 35 | 10.1 |
| 36 | 9.6 |
| 37 | 9.2 |

An insurer issued 2 fully continuous whole life policies, with benefit of 1, each issued at time $t = 0$ to lives ages 31, and 35 at issuance.
Determine the benefit reserve at $t = 2$ for this portfolio of 2 policies.

- a. 0.1913
- b. 0.1837
- c. 0.1724
- d. 0.1533
- e. 0.1587
- Unanswered

The time is 8:41

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15. Let ${}_kL$ denote the prospective-loss-at-time- $k$ random variable for a fully discrete whole life insurance of 2000 issued to $(x)$.
you are given:

(i) $A_x = 0.129$
(ii) $A_{x+n} = 0.404$

Calculate the agregate reserve at time $n$ for 150 policies at this type.

- a. 94,579
- b. 94,719
- c. 94,789
- d. 94,889
- e. 94,669
- Unanswered

The time is 8:41

---

16. For a $8$-year endowment insurance on ($x$) you are given:

(i) The death benefits are payable at the moment of death.
(ii) Premiums are paid continuously, are determined using the equivalence principle.
(iii) $\mu_x(t) = 0.052$ for $t > 0$
(iv) $\delta = 0.037$
(v) ${}_tL$ is the prospective loss at time t.
(vi) You may not need all of the above to do the problem.

Calculate $3000\bar{P}\left(\bar{A}_{x:\overline{8}|}\right)$

- a. 413
- b. 438
- c. 453
- d. 373
- e. 383
- Unanswered

The time is 8:41

---

17. 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)

| $k$ | $1000\ {}_kV^{\,1}_{50:\overline{5}|}$ | $\mathrm{Var}[{}_kL \mid K(50) \geq k]$ |
|---|---|---|
| 1 | 1.06 | 21,347 |
| 2 | 1.64 | 17,641 |
| 3 | 1.72 | 13,089 |

(vi) The losses are independent.

Calculate the aggregate terminal benefit reserve on January 1,1997.

- a. 4,198
- b. 4,122
- c. 4,114
- d. 4,314
- e. 4,150
- Unanswered

The time is 8:41

18. A special fully discrete whole life insurance on (40).
You are given:

(i) The net premium of this insurance is equal to $P_{20}$
(ii) ${}_kV = kV_{20}, \quad 0 \leq k \leq 19$
(iii) ${}_{11}V = {}_{11}V_{20} = 0.08047$

(iv) $q_{40+k} = q_{20+k} + .01, \quad 0 \le k \le 19$
(v) $q_{30} = 0.008366$

Calculate the $b_{11}$, the death benefit in year 11

- a. 0.499
- b. 0.429
- c. 0.579
- d. 0.419
- e. 0.519
- Unanswered

The time is 8:41

---

19. You are given:

(i) Lives (21) and (42) are independent.
(ii) The force of mortality for (21) is $\mu_x^1 = 0.04$
(iii) The force of mortality for (42) is $\mu_x^2 = 0.08$

Calculate the probability that both lives survive 22 years.

- a. 0.071
- b. 0.169
- c. 0.145
- d. 0.122
- e. 0.128
- Unanswered

The time is 8:41

---

20. 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 | 0.10 | 0.12 |
| 1 | 0.11 | 0.16 |

| | | |
|---|---|---|
| 2 | 0.12 | 0.23 |

Calculate ${}_{1|}q_{xy}$

- a. 0.189
- b. 0.226
- c. 0.171
- d. 0.200
- e. 0.185
- Unanswered

The time is 8:41

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21. Two lives $(x)$ and $(y)$ have identical expected mortality.
You are given:

(i) $P_x = P_y = 0.097$
(ii) $P_{\overline{xy}} = 0.058$, where $P_{\overline{xy}}$ is the annual benefit premium for a fully discrete insurance of 1 on $\overline{xy}$.
(iii) $d = 0.05$

Calculate $P_{xy}$, the annual benefit premium for a fully discrete insurance of 1 on $\overline{xy}$

- a. 0.214
- b. 0.180
- c. 0.234
- d. 0.102
- e. 0.168
- Unanswered

The time is 8:41

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22. The number of accidents follows a Poisson process with mean *9* per day.
Each accident generates 1,2 or 3 claimants with probabilites

0.45, 0.35, 0.2

respectively.
Calculate the expected value of the number of claimants in *2* days.

- a. 35
- b. 32
- c. 31
- d. 28
- e. 33
- Unanswered

The time is 8:41

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

| $x$ | $q_x^{(1)}$ | $q_x^{(2)}$ | $q_x^{(3)}$ | $p_x^{(\tau)}$ | $l_x^{(\tau)}$ | $d_x^{(1)}$ | $d_x^{(2}$ | $d_x^{(3)}$ | $d_x^{(\tau)}$ |
|---|---|---|---|---|---|---|---|---|---|
| 37 | 0.15 | 0.05 | 0.09 | 0.71 | 1000.00 | 150.00 | 50.00 | 90.00 | 290.00 |
| 38 | 0.08 | 0.11 | 0.07 | 0.74 | 710.00 | 56.80 | 78.10 | 49.70 | 184.60 |
| 39 | 0.14 | 0.05 | 0.10 | 0.71 | 525.40 | 73.56 | 26.27 | 52.54 | 152.37 |
| 40 | 0.08 | 0.04 | 0.13 | 0.75 | 373.03 | 29.84 | 14.92 | 48.49 | 93.25 |
| 41 | 0.09 | 0.11 | 0.12 | 0.68 | 279.78 | 25.18 | 30.78 | 33.57 | 89.53 |
| 42 | 0.16 | 0.10 | 0.12 | 0.62 | 190.25 | 30.44 | 19.03 | 22.83 | 72.30 |

Compute ${}_5q_{38}^{(3)}$

- a. 0.292
- b. 0.235
- c. 0.199
- d. 0.223
- e. 0.370
- Unanswered

The time is 8:41

24. 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) $l_x^{(\tau)} = 3000$
(iv) $q_x^{(2)} = 0.36$
(v) $d_x^{(1)} = (0.41)d_x^{(2)}$

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

- a. 0.61
- b. 0.49
- c. 0.58
- d. 0.66
- e. 0.54
- Unanswered

The time is 8:41

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25. 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) $q_x^{(2)} = 0.38$
(v) $d_x^{(1)} = (0.42)d_x^{(2)}$

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

- a. 0.49
- b. 0.37
- c. 0.36
- d. 0.45
- e. 0.51
- Unanswered

The time is 8:41

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26. Harold has been disabled and will begin receiving disabilty payments.

You are given:

(i) $v = 0.92$
(ii)The benefit for accidental death (Cause (1)) is 0 for all years.
(iii) $\mu_{63}^{(1}(t) = .1(4 - t), \quad t \le 4$
( iv) $\mu_{63}^{(2)}(t) = .1t, \quad t \le 4$
( v) Payments of 30,000 begin today, his 63$^{th}$ birthday.
( vi) On every birthdays up to and including his 67$^{th}$ birthday, he will receive 30,000 as long as he has not recovered or died.

Calculate the APV of Harold's disability payments.

- a. 66,946
- b. 61,591
- c. 65,583
- d. 71,564
- e. 71,285
- Unanswered

The time is 8:41

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27. For a pension plan portfolio, you are given:

(i) $i = .06$
(ii) 120 individuals with mutually independent future lifetimes are each to receive a whole life annuity-due.
(iii)

| Age | Number of annuitants | Annual payments | $\ddot{a}_x$ | $A_x$ | $^2A_x$ |
|---|---|---|---|---|---|
| 54 | 70 | *6* | 12.48556 | 0.29327 | 0.12267 |
| 67 | 50 | *2* | 9.37262 | 0.46947 | 0.26283 |

Using the normal approximation, calculate the 95th percentile of the distribution of the present value random variable of this portfolio.

- a. 6,490
- b. 6,473

- c. 6,461
- d. 6,483
- e. 6,491
- Unanswered

The time is 8:41

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28. A member of a high school math team is practicing for a contest. Her advisor has given her practice problems: Her advisor told her to first choose problems from three specific ptoblems $x$, $y$, and $z$ and once these problems are solved she can move to solve other problems.
She randomly chooses one of the problems $x$, $y$, and $z$, and works on it until she solves it. Then she randomly chooses one of the remaining two unsolved problems, and works on it until solved. Then she works on the last unsolved problem and then moves on to the remaining problems.
She solves problems at a Poisson rate of 1 problem per *4* minutes.
Calculate the probability that she has solved problem $z$ within *8* minutes of starting the problems.

- a. 0.76
- b. 0.66
- c. 0.72
- d. 0.47
- e. 0.59
- Unanswered

The time is 8:41

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29. For a 20-year deferred whole life annuity-due of 1 per year on (36), you are given:

(i) Mortality follows De Moivre's law with $\omega = 106$.
(ii) $i = 0$

Calculate the actuarial present value at issue of the annuity.

- a. 15.93
- b. 18.21

- c. 19.64
- d. 16.45
- e. 20.04
- Unanswered

The time is 8:41

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30. For a special fully discrete whole life of 10,000 on ($x$), you are given:

(i) ${}_{10}\text{AS} = 1637$
(ii) $G = 300$
(iii) ${}_{11}\text{CV} = 1625$
(iv) $c_{10} = 0.05$ is the fraction of gross premium paid at time 10 for expenses.
(v) $e_{10} = 60$ is the amount of per policy expense paid at time 10.
(vi) Death and withdrawal are the only decrements.
(vii) $q_{x+10}^{(d)} = 0.03$
(viii) $q_{x+10}^{(w)} = 0.19$
(ix) $i = 0.06$

Calculate ${}_{11}\text{AS}$.

- a. 1,808
- b. 1,657
- c. 1,651
- d. 1,773
- e. 1,750
- Unanswered

The time is 8:41

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Make sure that you answered all the problems before clicking below. Please report any bug to:
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