3.5. You are given:

(i)

x	l_x
60	99,999
61	88,888
62	77,777
63	66,666
64	55,555
65	44,444
66	33,333
67	22,222

(ii) $a = {}_{3.4|2.5}q_{60}$ assuming a uniform distribution of deaths over each year of age.

(iii) $b = {}_{3.4|2.5}q_{60}$ assuming a constant force of mortality over each year of age.

Calculate $100{,}000(a - b)$.

(A) -24

(B) 9

(C) 42

(D) 73

(E) 106

[This was Question 25 on the Fall 2013 Multiple Choice exam.]

7.30. For two fully discrete whole life insurance policies on (*x*), you are given:

(i)

	Death Benefit	Annual Net Premium	Variance of Loss at Issue
Policy 1	8	1.250	20.55
Policy 2	12	1.875	*W*

(ii) $i = 0.06$

(iii) The two policies are priced using the same mortality table.

Calculate *W*.

(A) 30.8

(B) 38.5

(C) 46.2

(D) 53.9

(E) 61.6

[This was Question 12 on the Spring 2016 Multiple Choice exam.]

7.37. For a fully continuous whole life insurance of 10,000 issued to (40) you are given the following information:

(i) Premiums are paid at a rate of 100 per year.

(ii) $\delta = 0.05$

(iii) $\mu_{70.5} = 0.038$

(iv) For $t = 30.5$, $\dfrac{d}{dt}\,_tV = 292$

Calculate $_{30.5}V$.

(A) 5000

(B) 5500

(C) 6000

(D) 6500

(E) 7000

[This was Question 10 on the Spring 2017 Multiple Choice exam.]

4.16. You are given the following extract of ultimate mortality rates from a two-year select and ultimate mortality table:

x	q_x
50	0.045
51	0.050
52	0.055
53	0.060

The select mortality rates satisfy the following:

(i) $\quad q_{[x]} = 0.7q_x$

(ii) $\quad q_{[x]+1} = 0.8q_{x+1}$

You are also given that $i = 0.04$.

Calculate $A^{1}_{[50]:\overline{3}|}$.

(A) 0.08

(B) 0.09

(C) 0.10

(D) 0.11

(E) 0.12

[This was Question 5 on the Fall 2016 Multiple Choice exam.]

5.7. You are given:

(i) $A_{35} = 0.188$

(ii) $A_{65} = 0.498$

(iii) $_{30}p_{35} = 0.883$

(iv) $i = 0.04$

Calculate $1000\,\ddot{a}^{(2)}_{35:\overline{30|}}$ using the two-term Woolhouse approximation.

(A) 17,060

(B) 17,310

(C) 17,380

(D) 17,490

(E) 17,530

[This was Question 7 on the Spring 2015 Multiple Choice exam.]

7.39.   A warranty pays 2000 at the end of the year of the first failure if a washing machine fails within three years of purchase. The warranty is purchased with a single premium, G, paid at the time of purchase of the washing machine.

You are given:

(i)   10% of the washing machines that are working at the start of each year fail by the end of that year.

(ii) $i = 0.08$

(iii)   The sales commission is 35% of G.

(iv) G is calculated using the equivalence principle.

Calculate G.

(A)   630

(B)   660

(C)   690

(D)   720

(E)   750

[This was Question 12 on the Spring 2017 Multiple Choice exam.]

1.1 Which of the following is not true with regard to underwriting?

(A) Life insurance policies are typically underwritten to prevent adverse selection.

(B) The distribution method affects the level of underwriting.

(C) Single premium immediate annuities are typically underwritten to prevent adverse selection.

(D) Underwriting may result in an insured life being classified as a rated life due to the insured's occupation or hobby.

(E) A pure endowment does not need to be underwritten to prevent adverse selection.

6.6. Question 6.6 was misclassified and therefore was moved to Question 8.27.

8.2. You are evaluating the financial strength of companies based on the following multiple state model:
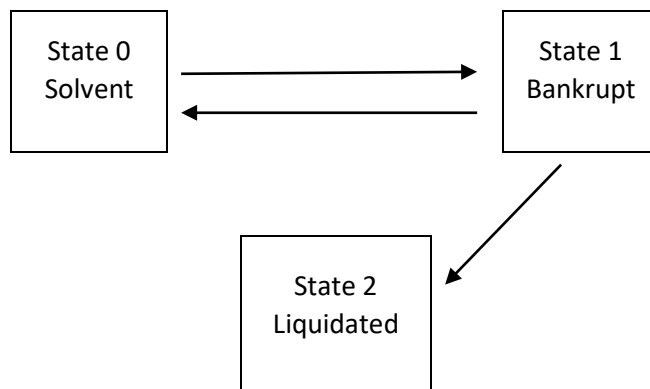
For each company, you assume the following constant transition intensities:

(i) $\mu^{01} = 0.02$

(ii) $\mu^{10} = 0.06$

(iii) $\mu^{12} = 0.10$

Using Kolmogorov's forward equations with step $h = 1/2$, calculate the probability that a company currently Bankrupt will be Solvent at the end of one year.

(A) 0.048

(B) 0.051

(C) 0.054

(D) 0.057

(E) 0.060

[This was Question 16 on the Fall 2012 Multiple Choice exam.]

LM.2. In a study of 1,000 people with a particular illness, 200 died within one year of diagnosis. Calculate a

95% (linear) confidence interval for the one-year empirical survival function.

(A)   (0.745, 0.855)

(B)   (0.755, 0.845)

(C)   (0.765, 0.835)

(D)   (0.775, 0.825)

(E)   (0.785, 0.815)

7.40.

For a fully discrete whole life insurance of 1000 on (*x*), you are given:

      (i)   For calculating gross premium reserves in year 8, the following assumptions are made:

- $q_{x+7} = 0.03$
- Annual expenses of 100, payable at the beginning of the year
- $i = 0.07$

      (ii)   Actual experience during year 8 for this policy is:

- The policy is in force at the end of year 8.
- The annual expenses are 75, paid at the beginning of the year.
- The interest earned is 3%.

      (iii)   Gain by source for year 8 is analyzed in the following order: mortality, expense, interest.

Calculate the gain from expense in policy year 8.

(A)   25.00

(B)   25.75

(C)   26.75

(D)   27.50

(E)   28.50

[This was Question 16 on the Spring 2017 Multiple Choice exam.]