Errata and Updates for ASM Exam MLC (Tenth Edition) Sorted by Page

[6/8/2010] On page xi, on the first line under "Old exam question", delete www after "questions".

[7/22/2010] On page 34, on the sixth line, change "on starts" to "one starts".

[6/9/2010] On page 34, fourth line of Section 3.3, change the three arguments x to t:

$s_{T(x)}(t) = \Pr\big(T(x) > t\big)$. (*Models for Quantifying Risk* uses $S(t)$ instead of $s(t)$.)

[7/22/2010] On page 34, third line from the bottom, change $X \geq 40$ to $X > 40$.

[7/15/2010] On page 41, in the solution to exercise 3.9, on the third line, ${}_{15}p_{50}$ is 0.54, not 0.6.

[5/28/2010] On pages 47 and 51, in formula (4.8), change the three t's in the integrand to s's:

$$ {}_tq_x = \int_0^t {}_sp_x\,\mu_x(s)\mathrm{d}s $$

[5/28/2010] Page 51: see errata for page 47.

[6/28/2010] On page 62, in the solution to exercise 4.23, 3 lines from the end, change "legs of lengths 0 and 1" to "legs of length 0.5 and 1".

[5/28/2010] On page 83, on the second to last displayed line, the first ${}_{50}p_{20}$ should be ${}_{50}q_{20}$.

[6/9/2010] On page 102, in the solution to Quiz 6-1, a negative sign is missing on the right of the first displayed line, and the second displayed line's terms should be reversed:

$$ \begin{aligned} \int_{50}^{50+t} \mu_x\,\mathrm{d}x &= -\ln(10-\sqrt{x})\Big|_{50}^{50+t} \\ &= \ln(10-\sqrt{50}) - \ln(10-\sqrt{50+t}) \end{aligned} $$

[5/28/2010] On page 107, in equation (7.5) and (7.6), change $e_{x:\overline{n-m}|}$ to $e_{x+m:\overline{n-m}|}$ (once in each equation).

[8/2/2010] On page 110, in Table 7.1, replace formula (7.6) with $= e_{x:\overline{m-1}|} + {}_mp_x(1+e_{x+m:\overline{n-m}|}), \quad m<n$.

[5/25/2010] On page 150, in the solution to exercise 8.14, on the 6th line, change $T^2 \wedge 2$ to $(T \wedge 2)^2$.

[6/28/2010] On page 153, in the solution to exercise 8.23, on the second line, delete the period in 7,126,0.36.

[6/14/2010] On pages 163–164, in the last table on page 163 and the first table on page 164, on the line for age 42, change 9.586,465 to 9,586,464.

[6/14/2010] On page 188, last displayed line of page, put a bar on A_{65}.

[6/14/2010] On page 208, in the solution to exercise 10.31, on the first displayed line, change 0.4 to 0.04.

[8/11/2010] On page 211, on the first line of Subsection 11.2.1, change "a a positive real number" to "δ a positive real number".

[6/14/2010] On page 212, on the first displayed line, change a in the exponent to δ.

[8/12/2010] On page 256, on the second to last line of the solution to Quiz 12-2, put an equals sign between (0.09476) and 0.01634.

[8/17/2010] On page 259, fourth line of answer to Example 13A, replace $\omega = 70$ with $\omega - x = 70$.

[6/14/2010] On page 260, on the third line of the answer to Example 13C, replace the two subscripts 30 with 40.

[8/4/2010] On page 276, in the solution to Quiz 13-1, on the last line, change the two subscripts from 50 to 60: ${}_{10}p_{60} - {}_{20}p_{60}$.

[8/18/2010] On page 286, in formula (14.13), delete the 0 in the first subscript.

[8/31/2010] On page 398, in the solution to exercise 18.24, on the fourth line, the lower limit of the sum should be 0 instead of 1.

[9/3/2010] On page 481, in the solution to exercise 22.7, on the third line, delete one of the "is to observe"'s.

[8/25/2010] On page 490, the solution to exercise 22.39 is incorrect. The correct solution is

At issue, the present value of premiums is $\pi\ddot{a}_{20:\overline{10|}}$, and the annuity-due may be valued as

$$\ddot{a}_{20:\overline{10|}} = \sum_{k=0}^{9} v^k \, {}_kp_{20} = \sum_{k=0}^{9} \left(\frac{0.99}{1.05}\right)^k = \frac{1-(0.99/1.05)^{10}}{1-0.99/1.05} = 14.01948$$

The present value of benefits can be split into annuity benefits and refund of premium benefits. The present value of a 10-year deferred life annuity of 1 is

$$\ddot{a}_{30} = \frac{1+i}{q+i} = \frac{1.05}{0.06} = 17.5$$

$${}_{10|}\ddot{a}_{20} = v^{10} \, {}_{10}p_{20} \, \ddot{a}_{30} = \left(\frac{0.99}{1.05}\right)^{10} (17.5) = 9.716212$$

So the present value of a 10-year deferred life annuity of 1000 is 9716.212.

The present value of the refund of premium benefits, since the premiums are refunded with interest, is the probability of death in the first year times 0.5π, plus the probability of death in the second year times π, etc. Due to the constant rate of mortality, this is an increasing annuity-certain. Calling its present value R,

$$\begin{aligned} R &= 0.5\pi \sum_{k=1}^{10} k \, {}_{k|}q_{20} \\ &= 0.005\pi \sum_{k=1}^{10} k(0.99^{k-1}) \\ &= 0.005\pi(I\ddot{a}_{\overline{10|}}) \end{aligned}$$

where $d = 0.01$ for the increasing certain annuity-due. The formula for the increasing certain annuity-due is

$$\begin{aligned} (I\ddot{a})_{\overline{10|}} &= \frac{\ddot{a}_{\overline{10|}} - 10v^{10}}{d} \\ \ddot{a}_{\overline{10|}} &= \frac{1-0.99^{10}}{0.01} = 9.56179 \\ (I\ddot{a})_{\overline{10|}} &= \frac{9.56179 - 10(0.99^{10})}{0.01} = 51.7972 \end{aligned}$$

so the value of the premium refund is $0.005(51.7972)\pi = 0.258986\pi$. Equating the premiums with the benefits,

$$\begin{aligned} 14.01948\pi &= 9716.212 + 0.258986\pi \\ \pi &= \frac{9716.212}{14.01948 - 0.258986} = \boxed{\mathbf{1291.23}} \end{aligned}$$

[8/23/2010] On page 590, in the solution to exercise 28.7, on the fourth line, put a double-dot over $a_{x:\overline{3}|}$.

[7/8/2010] On page 660, the solution to Example 32D is incorrect staring with the fourth displayed line. Calculating π is unnecessary. The corrected solution is:

Let's calculate π by setting $k=10$ in equation (32.3), at which point the benefit reserve is 1000.

$$\begin{aligned} 1000 &= (\pi - 1000vq)\ddot{s}_{\overline{10}|} \\ \ddot{s}_{\overline{10}|} &= \frac{1.2^{10}-1}{0.2/1.2} = 31.1504 \\ \pi - \frac{1000(0.03)}{1.2} &= \frac{1000}{31.1504} = 32.1023 \end{aligned}$$

Then the benefit reserve at the end of three years, ${}_3V$, is $(\pi - 30/1.2)\ddot{s}_{\overline{3}|} = 32.1023(4.368)$, and

$$\begin{aligned} \ddot{s}_{\overline{3}|} &= \frac{1.2^3-1}{0.2/1.2} = 4.368 \\ {}_3V &= 32.1023(4.368) = \boxed{\mathbf{140.22}} \end{aligned}$$

[7/8/2010] On page 663, in Table 32.1,

1. On the second line, change $h<k$ to $k<h$.
2. 8 lines from the end, the subtraction sign $-$ before $\beta(m)$ should be changed to an addition sign $+$.

[7/12/2010] On page 664, the solution to Example 32G is incorrect. The correct solution is

We will use formula (32.7), which in this case is

$${}_{10}V^{(4)}_{45:\overline{20}|} = {}_{10}V_{45:\overline{20}|} + \beta(4)P^{(4)}_{45:\overline{20}|}\,{}_{10}V^{\underline{1}}_{45:\overline{20}|}$$

The benefit reserve for an annual premium endowment insurance, ${}_{10}V_{45:\overline{20}|}$, is calculated using the insurance-ratio formula.

$${}_{10}V_{45:\overline{20}|} = \frac{0.07+0.47-0.09-0.25}{1-0.09-0.25} = 0.303030$$

Based on the tables, $\beta(4) = 0.38424$.

The fractional premium for the endowment insurance, $P^{(4)}_{45:\overline{20}|}$, is

$$\begin{aligned} A^{(4)}_{45:\overline{20}|} &= \frac{i}{i^{(4)}}A^{\underline{1}}_{45:\overline{20}|} + A^{\underline{1}}_{45:\overline{20}|} \\ &= 1.02223(0.09) + 0.25 = 0.342001 \\ \ddot{a}^{(4)}_{45:\overline{20}|} &= \frac{1-A^{(4)}_{45:\overline{20}|}}{d^{(4)}} = \frac{1-0.3475558}{0.05785} = 11.2782 \\ P^{(4)}_{45:\overline{20}|} &= \frac{0.342001}{11.2782} = 0.030324 \end{aligned}$$

The benefit reserve for an annual premium term insurance, ${}_{10}V^{\underline{1}}_{45:\overline{20}|}$, is

$$\ddot{a}_{55:\overline{10}|} = \frac{1-A_{55:\overline{10}|}}{d} = \frac{1-0.07-0.47}{0.05660} = 8.1272$$

$$\ddot{a}_{45:\overline{20|}} = \frac{1-A_{45:\overline{20|}}}{d} = \frac{1-0.09-0.25}{0.05660} = 11.6608$$

$$\begin{aligned} {}_{10}V^{1}_{45:\overline{20|}} &= A^{1}_{55:\overline{10|}} - P^{1}_{45:\overline{20|}}\,\ddot{a}_{55:\overline{10|}} \\ &= 0.07 - \left(\frac{0.09}{11.6608}\right)8.1272 = 0.007273 \end{aligned}$$

Therefore, the reserve for the fractional premium endowment insurance of this example is

$$1000\,{}_{10}V^{(4)}_{45} = 303.030 + (0.38424)(0.030324)(7.273) = \boxed{\mathbf{303.11}}$$