

Errata and updates for ASM Exam 3L (Tenth Edition Third Printing) sorted by page

Note the change to Practice Exam 5:9.

- [12/17/2011] On page 6, on the first line of Section 1.3, $\Pr(B \neq 0)$ should be $\Pr(B) \neq 0$.
- [9/27/2011] On page 11, in the solution to exercise 1.3, on the first displayed line, change $\mathbf{E}[X + Y]^3$ to $\mathbf{E}[(X + Y)^3]$.
- [5/29/2011] On page 13, in the solution to exercise 1.9, 7 lines from the end, change $\frac{3}{2}(7500)$ to $\frac{2}{3}(7500)$.
- [5/29/2011] On page 25, in the solution to exercise 2.8, at the end, delete (C), since the question is not multiple choice.
- [11/3/2011] On page 44, in the solution to question 3.14, on the second displayed line, change 100 to 300.
- [6/30/2011] On page 46, in the solution to exercise 3.19, on the first line of the page, delete the first $1/\theta$.
- [7/20/2011] On page 55, on the last line of the answer to Example 4H, change 0.02 to 0.05 and change the final answer to 4.
- [9/27/2011] On page 133, in the solution to exercise 8.28, on the first displayed line, change 0.9 to 0.1.
- [7/13/2011] On page 134, in the solution to exercise 8.31, on the third displayed line, there should be $\frac{1}{2}$ after the integral sign. On the fourth displayed line, there should be $\frac{1}{2}$ before $e^{-(u-\theta)}$, and the upper limit should be x instead of u . With these corrections, the two lines read:

$$\begin{aligned} F(x) &= F(\theta) + \int_{\theta}^x \frac{1}{2} e^{-(u-\theta)} du \\ &= \frac{1}{2} - \frac{1}{2} e^{-(u-\theta)} \Big|_{\theta}^x \end{aligned}$$

- [7/22/2011] On page 136, in the solution to Quiz 8-1, on the second line, change 35 to 25 and 36 to 26.
- [8/30/2011] On page 141, in the solution to exercise 9.6, on the first line, replace 1.644 with 1.6269 and 7.301 with 7.3759.
- [2/5/2012] On page 171, in Table 12.1, replace the enumerated list in the second bullet with:
1. $(0, S^2(n-1)/w_{\alpha})$.
 2. $(S^2(n-1)/w_{1-\alpha}, \infty)$.
 3. $(S^2(n-1)/w_{1-\alpha/2}, S^2(n-1)/w_{\alpha/2})$.

- [10/27/2011] On page 194, in the solution to exercise 13.16, on the first line, change $\frac{1}{\sqrt{10}}$ to $\frac{1}{10}$.
- [12/20/2011] On page 239, in the solution to exercise 17.6, the second sentence is cut off and should read
It's the usual CAS type of humor—it's not that the answer cannot be determined from the given information (almost never the right answer choice), rather there is too much information provided.
- [10/3/2011] On page 241, in the solution to exercise 17.15, on the second line, in the last two symbols, q should not be in the subscript. Change them to ${}_1q_0$ and ${}_2q_0$.

- [6/3/2011] On page 263, in the solution to exercise 18.37, on the last two displayed lines, add a right parenthesis before the last equals sign on each line.
- [12/19/2011] On page 281, 4 lines above the graph, change $\dot{e}_{x:\overline{n}}$ to $\dot{e}u : \overline{n}$.
- [9/27/2011] On page 332, in Table 22.1, on the line for ${}_s p_x \mu_{x+s}$, in the Constant force of mortality column, place a negative sign before the expression.
- [1/7/2012] On page 337, in exercise 22.29, on the last line, put a period after 97.5.
- [6/7/2011] On page 349, on the fourth line, delete “actuarial”.
- [1/23/2012] On page 373, in the solution to Quiz 23-1, on the second displayed line, replace $A_{30:\overline{10}}$ with $A_{30:\overline{10}}^{\frac{1}{2}}$.
- [1/30/2012] On page 382, in exercise 24.4, answer choice B. should be 375.
- [6/3/2011] On page 415, in the solution to exercise 25.17, on the second line, remove the bar from ${}^2\bar{A}_x$.
- [6/7/2011] On page 430, on the fourth line, delete “actuarial”.
- [6/3/2011] On page 436, in the solution to exercise 26.1, on the second line, change the second v_{10} to v_t .
- [12/27/2011] On page 441, in the solution to question 26.21, on the third displayed line, remove the negative sign at the start of the line.
- [7/28/2011] On page 463, in the list of additional released exam questions, delete the “,35” in “M-S05:15,35”.
- [8/15/2011] On page 477, in Quiz 28-1, the values given are impossible, since the resulting 10-year pure endowment of 0.6 is greater than $e^{-10\delta}$. Therefore, change \bar{A}_{60} to 0.42.
- [6/6/2011] On page 477, on the third line of the paragraph beginning “Whole life”, replace the expression $e^{-(\delta+\mu_x(t))}$ with $e^{-(\delta t + \int_0^t \mu_x(u) du)}$.
- [6/6/2011] On page 486, in the solution to exercise 28.5, on the third line, replace μ with $k + \mu_{x+t}$.
- [8/15/2011] On page 490, revise the solution to Quiz 28-1 in line with the revised value of \bar{A}_{60} given above:
 Since $\bar{A}_{50} = \bar{A}_{50:\overline{10}}^1 + {}_{10}E_{50}\bar{A}_{60}$, we have ${}_{10}E_{50} = (0.22 - 0.01)/0.42 = 0.5$. Then $\bar{A}_{50:\overline{10}} = 0.01 + 0.5 = 0.51$. Also, since $\bar{A}_x = 1 - \delta \bar{a}_x$, we have $\delta = (1 - 0.22)/13 = 0.06$. Therefore
- $$\bar{a}_{50:\overline{10}} = \frac{1 - \bar{A}_{50:\overline{10}}}{\delta} = \frac{1 - 0.51}{0.06} = \boxed{8\frac{1}{6}}$$
- [7/27/2011] On page 500, on the first line of the answer to Example 29G, change “second” to third. It is referring to the equation one line above Example 29G.
- [7/28/2011] On page 514, in the list of additional released exam questions, remove SOA M-F06:4.
- [7/27/2011] On page 527, the first sentence of the fifth paragraph (starting with “If $I = 1$ ”) skips a step. Replace it with these two sentences:
 If $I = 1$, $Y | I$ is v^n times a whole life annuity on $(x + n)$, and we know the expected value and variance for this annuity; the expected value is \bar{a}_{x+n} and the variance is $({}^2\bar{A}_{x+n} - \bar{A}_{x+n}^2)/\delta^2$. Therefore, $E[Y | I] = v^n \bar{a}_{x+n}$ and $\text{Var}(Y | I) = v^{2n}({}^2\bar{A}_{x+n} - \bar{A}_{x+n}^2)/\delta^2$.
- [6/15/2011] On page 532, in Table 30.1, formula (30.12) should have d instead of d^2 in the denominator.
- [7/11/2011] On page 535, in exercise 18.10(iii), change 1250 to 125.
- [7/28/2011] On page 540, add SOA M-F06:4 to the list of additional released exam questions.

- [7/11/2011] On page 544, in the solution to exercise 30.10, on the 5th and 6th lines of the page, change 1250 to 125. On the 7th line, change 625 to 62.5.
- [9/8/2011] On page 555, on the 4th line of the second paragraph, change 14/5 to 14/6.
- [7/14/2011] On page 594, in the solution to exercise 32.8, on the second displayed line, change ${}_5E_x$ to ${}_{10}E_x$.
- [7/28/2011] On page 621, in the list of additional released exam questions, add “,35” after “M-S05:8,14”
- [7/15/2011] On page 632, the solution to exercise 33.38 is incorrect. Replace the part starting with “The present value of the refund of premium...” to the end with the following, which also includes an easier method:

The present value of the refund of premium benefits, since the premiums are refunded with interest, is the present value of the premiums themselves. If death occurs in year k , the premiums up to that time are a k -year certain annuity-due. So the present value of the refund of premium benefits is

$$\begin{aligned}
 \text{PV Refund} &= 0.5\pi \sum_{k=1}^{10} {}_{k-1}|q_{20} \ddot{a}_{\overline{k}|} \\
 &= 0.5\pi \sum_{k=1}^{10} 0.01(0.99^{k-1}) \left(\frac{1 - 1/1.05^k}{0.05/1.05} \right) \\
 &= 0.005(21)\pi \left(\sum_{k=1}^{10} 0.99^{k-1} - \frac{1}{1.05} \sum_{k=1}^{10} \left(\frac{0.99}{1.05} \right)^{k-1} \right) \\
 &= 0.105 \left(\frac{1 - 0.99^{10}}{1 - 0.99} - \frac{1}{1.05} \left(\frac{1 - (0.99/1.05)^{10}}{1 - 0.99/1.05} \right) \right) = 0.225609
 \end{aligned}$$

Equating the premiums with the benefits,

$$\begin{aligned}
 7.78379\pi &= 9716.212 + 0.225609\pi \\
 \pi &= \frac{9716.212}{7.78379 - 0.225609} = \boxed{1285.523}
 \end{aligned}$$

An easier way to solve this question is to equate the accumulated premiums at time 10 to the present value of the annuity, 17,500. The nonrefundable premiums are accumulated with mortality and interest, and the refundable premiums are accumulated with interest only, so

$$\pi = \frac{17,500}{0.5(\ddot{s}_{20:\overline{10}|} + \ddot{s}_{\overline{10}|})}$$

We computed $\ddot{a}_{20:\overline{10}|}$ above, and accumulating with mortality and interest,

$$\ddot{s}_{20:\overline{10}|} = 7.78379 \left(\frac{1.05^{10}}{0.99^{10}} \right) = 14.01949$$

while

$$\ddot{s}_{\overline{10}|} = \frac{1.05^{10} - 1}{0.05/1.05} = 13.20679$$

so the premium is $17,500 / (0.5(14.01949 + 13.20679)) = \boxed{1285.523}$.

- [9/5/2011] On page 641, 3 lines below formula (34.2), change the expression before “is wrong” to $(b + P/\delta)^2$.
- [6/21/2011] On page 670, in the caption for Figure 36.2, change fuction to function.
- [8/15/2011] On page 707, on the third displayed line below Table 38.2, change the denominator to ${}_{h-k}P_{x+k:\overline{n-k}|}$ and change $h < k$ to $k < h$.

[2/12/2012] On page 734, in question 39.8, on the second line from the end of the question, change i from 0.025 to 0.03.

[10/5/2011] On page 758, in exercise 40.18(i), “full” should be “fully”. Also, the first column of the table represents the number of survivors on July 1, 2009.

[10/5/2011] On page 786, in the solution to exercise 41.23, on the third line, change π_{45} to π_{19} .

[10/22/2011] On page 819, in the solution to exercise 43.17, on the first line, replace $q_x q_y$ with ${}_t q_x {}_t q_y$.

[9/27/2011] On page 869, in exercise 46.23, replace the first sentence with

For two independent lives, (30) and (50), a continuous life annuity pays 100 per year to (50) after the death of (30), but only until (50) reaches age 80.

[7/29/2011] On page 892, delete SOA M-F06:24 from the list of additional released exam questions.

[7/28/2011] On page 1121, in the answer to question 12, the answer key should be E. Correct the answer key on page 1118 as well.

[10/18/2011] On page 1141, in the solution to question 21, a continuity correction should be applied. On the third line, replace “Then...” until the end of the solution with

A continuity correction is applied; if 15 widgets were observed to be defective, we could ask for the probability that the number defective is greater than any number between 14 and 15, so we’ll use 14.5. Then

$$1 - \Phi\left(\frac{15.5 - 10}{3.146}\right) = 1 - \Phi(1.430) = 1 - 0.924 = 0.076$$

Since it is a two-sided test, we double 0.076 to get **0.152**. (E)

[9/27/2011] On page 1141, in the solution to question 24, change the numerator 6 to 60 on the second to last line, and change the final answer from 582.3 to 582.0.

[10/17/2011] On page 1144, in the solution to question 4, on the first displayed line, change $g(\theta)$ to $g(a)$. On the second displayed line, change $\frac{dg}{d\theta}$ to $\frac{dg}{da}$.

[7/28/2011] On page 1202, in the solution to question 15, on the fifth line, remove the line from the presubscript of ${}_9|p_{40}$ at the end of the line, so that it becomes ${}_9p_{40}$. Make the same correction four lines from the end of the solution.

[7/29/2011] On page 1204 in the solution to question 27, on the first line, $\mu_{50}^{(1)}$ should be $\mu_{50}^{(1)}(t)$.

[10/12/2011] On page 1217, in the solution to question 8, on the last line of the page, change + to -. On the second line of page 1218, change + to -.

[7/29/2011] On page 1230, in the solution to question 1, on the second displayed line, q_{45} should be $q_{45}^{(s)}$.

[7/26/2011] On page 1273, in the solution to question 24, on the last displayed line, change $\frac{1}{20} = 0.05$ to $\frac{6}{20} = 0.30$.

[10/26/2011] On page 1287, in the solution to question 17, on the second line, replace $n - 1$ in the denominator with $n + 1$.

[10/15/2011] On page 1288, in the solution to question 20, replace the last two displayed lines with

$$\begin{aligned} Q &= \frac{26^2}{29.6} + \frac{48^2}{44.4} + \frac{14^2}{16.4} + \frac{27^2}{24.6} + \frac{13^2}{8} + \frac{7^2}{12} + \frac{7^2}{6} + \frac{8^2}{9} - 150 \\ &= 6.8012 \end{aligned}$$

On the second to last line, replace 7.1556 with 6.8012.

[7/28/2011] On page 1291, the lesson number for SOA Spring 2005 question 35 should be 33 instead of 27. The lesson number for SOA Fall 2006 question 4 should be 30 instead of 29. SOA Fall 2006 question 24 should be NS. The lesson number for SOA Spring 2007 question 29 should be 28 instead of NS.