

Errata and updates for ASM Exam STAM Study Manual (First Edition Second Printing) sorted by date

Practice Exam 5:2 is defective in that none of the five answer choices is correct.

Practice Exam 7:24, correct the question as indicated below, page 1089.

Practice Exam 11:5, correct the question as indicated below, page 1126.

[5/20/2020] On page 1279, in the solution to question 24, replace the third and fourth lines with

$$\begin{aligned}
 l &= 4 \ln \alpha + 6\alpha \ln \theta - (\alpha + 1) \sum_{i=1}^4 \ln(\theta + x_i) - 2\alpha \ln(\theta + 200) \\
 &= 4 \ln 0.6526 + 6(0.6526) \ln 38.8571 - 1.6526 \sum_{i=1}^4 \ln(38.8571 + x_i) - 2(0.6526) \ln 238.8571 \\
 &= -22.8443
 \end{aligned}$$

[5/5/2020] On page 1265, in the solution to question 19, on lines 3–7, change every X to $X \wedge 20$. On line 8, change “calculate above” to “calculated above”. On the third line from the end, change $10 \leq 10 < 20$ to $10 \leq X < 20$. The last line should be split into two lines; the split is between 114.6 and $\text{Var}(X \wedge 20)$.

[4/24/2020] On page 148, in the solution to Example 10D, replace the paragraph beginning “To fix the bias” with

To fix the bias of the loss cost method, we adjust the exposures. The adjustment consists of setting the number of exposures for each policyholder equal to the class differential. In this example, since we are not given the classes or their differentials, we need to know the base rate. The final indicated territory differentials will not vary as a function of the base rate, but we need it to calculate the average class differential. So let’s assume that the base rate in Territory 1 is 600. Then, since the average rate equals the base rate, the average class differential is 1 and no adjustment is needed to Territory 1 exposures; they are $90,000/600 = 150$.

Now let’s move on to Territory 2. Here, the base rate is $600(1.25) = 750$. But the average rate is 800. The average class differential is $800/750$. So we multiply the number of exposures by $800/750$ to obtain the adjusted exposures, weighted by class. This is equivalent to setting the adjusted number of exposures for each insured equal to the class differential for that insured. The number of exposures is $40,000/800 = 50$, so the adjusted number of exposures is $50(800/750) = 160/3$.

In Territory 3, the base rate is $600(1.6) = 960$ and the average rate is 1,200, making the average class differential $1200/960$. So we multiply exposures, $60,000/1,200 = 50$ by $1,200/960$, getting $50(1,200/960) = 62.5$.

Using these adjusted exposures, the loss cost is $28,000/(160/3) = 525$ in Territory 2 and $36,000/62.5 = 576$ in Territory 3. Dividing these by the 300 loss cost of Territory 1, we get $525/300 = 1.75$ for Territory 2 and $576/300 = 1.92$ for Territory 3, the same as with the loss ratio method.

[4/24/2020] On page 1126, in question 5, after the table, add

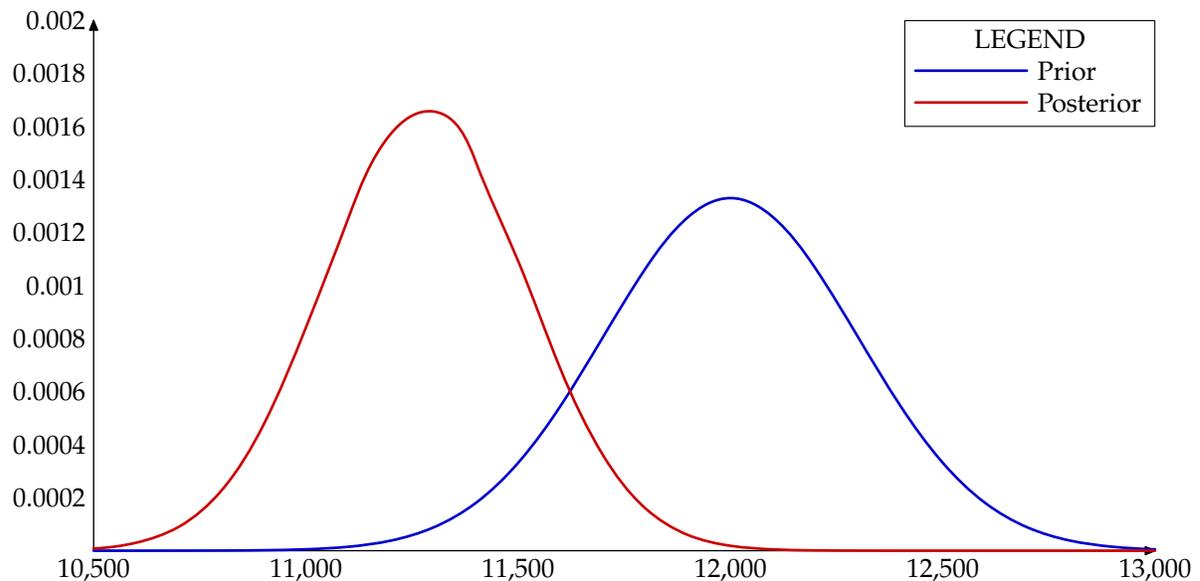
The base rate for Territory 1 is 300.

[4/24/2020] On page 1261, replace the solution to question 5 with

The number of exposures in Territory 1 is $45,000/300 = 150$. Since the base rate in Territory 1 is 300, this implies that the average class differential in Territory 1 is 1, so that base exposures in Territory 1 equal exposures in Territory 1, or 150.

In Territory 2, the base rate is $300(1.2) = 360$ and the average rate is 400. So each exposure is given a weight of $400/360 = 10/9$. There are $40,000/400 = 100$ exposures, so there are $100(10/9) = \boxed{111\frac{1}{9}}$ base exposures. **(B)**

- [4/21/2020] On page 1125, in question 2, on the last line of the table under “Deductible 1000”, change the periods to commas: 1.727 should be 1,727 and 3.558.799 should be 3,558,799.
- [4/3/2020] On page 1249, in the solution to question 3, on the second line, change “greater” to “less”.
- [4/2/2020] On page 1113, in question 31, delete statement (i).
- [3/31/2020] On page 1244, in the solution to question 23, on the fourth line, delete the 2 in $2(1 - \alpha)$. The factor 2 was already multiplied by 0.1 and 0.2 in the expression, which has 0.2 and 0.4. Two lines after this line, delete the parenthesized statement “(in the following expression, 2 was canceled)”.
- [3/7/2020] On page 138, in exercise 9.4, in the second table, change “Calendar Year” to “Accident Year” and change CY1, CY2, CY3, CY4 to AY1, AY2, AY3, AY4. On the last line, change “Calculated” to “Calculate”.
- [1/7/2020] On page 799,, replace the graph in Figure 44.1 with



- [10/13/2019] On page 1183, in the solution to question 28, three lines from the end, replace 104.43575 with 14.43575.
- [10/6/2019] On page 1273, in the solution to question 8, 3 lines above the table at the end, change “ $50(0.8) + 19 = \boxed{43}$ ” to “ $30(0.8) + 19 = \boxed{43}$ ”.
- [9/14/2019] On page 1267, in the solution to question 26, on the first line, change $\frac{2}{\beta^2}$ to $\frac{2}{\beta^3}$.
- [9/4/2019] On page 1256, in the solution to question 23, on the first displayed line, division signs (/) are missing from two exponents. The line should read

$$L(\mu) = \left(\frac{e^{-(1+2+4+7)/\mu}}{\mu^4} \right) \left(e^{-20/\mu} \right) \left(\frac{\mu^4}{(\mu + 1)^5} \right) = \frac{e^{-34/\mu}}{(\mu + 1)^5}$$

- [7/24/2019] On page 96, on the last line, change “insurane” to “insurance”.

[6/7/2019] On page 1061, in question 32, add the following sentence to (i):
The deductible is subtracted from the payment after coinsurance is applied.

[6/7/2019] On page 1191, in the solution to question 2, change the last line to

$$0.9 \left(\frac{21,000(0.1953125)}{0.7} \right) = \boxed{5,273.438}$$

None of the answer choices is correct.

[5/9/2019] On page 482, in the solution to exercise 29.28, on the fourth line, the last right parenthesis in the denominator should be before the exponent $\alpha + 1$:

$$\frac{\alpha^3(1000^{3\alpha})}{((1200)(1700)(4000))^{\alpha+1}}$$

[3/17/2019] On page 1278, in the solution to question 21, on the second line of the page, change $r = 1$ to $r = 3$. On the second to last line of the solution, change $1 - 2P_X(0)$ to $3 - 2P_X(0)$.

[2/21/2019] On page 130, in the solution to exercise 8.9, in the table, the Development Years should be 1, 2, 3, and 4 instead of 2, 3, 4, and 5.

[2/13/2019] On page 296, right after formula (19.3), replace the next 4 lines with

These formulas are provided in the distribution tables you get at the exam at the beginning of Section B.2. Formula (19.2) is the more important one, in that it may save a little work in a question like the following.

[2/13/2019] On page 976, in the solution to exercise 53.3, on the third displayed line, replace $v_Z -$ with $v_X =$.

[2/13/2019] On page 1089, in question 24(i), change 6% to 6.5%.

[2/10/2019] On page 221, in the solution to exercise 13.27, on the third line, change $\alpha - 1$ to $\alpha - 1 = 1$.

[1/30/2019] On page 616, 3 lines below Theorem 1, delete the word "squared" after "mean".

[1/22/2019] On page 1255, in the solution to question 22, on the last line of the page, change 2000^2 to 2000^4 .

[1/20/2019] On page 458, change the sentence on lines 5–6 beginning with "Expect" to
Expect lots of exam questions on maximum likelihood estimation.

[1/20/2019] On page 465, in exercise 29.1, in answer choice C, change theta to θ .

[1/20/2019] On page 485, on the second line of item 3 in the enumerated list, change $|\sigma a^2$ to σ^2 .

[1/13/2019] On page 828, in exercise 47.24, on the line below the table, change "than" to "that".

[1/10/2019] On page 757, replace the paragraph before Example 42B with the following paragraph:

Special care is needed when the region on which the model distribution has support (in other words, nonzero density) has bounds that depend on a prior parameter. For example, if the model distribution is uniform on $[a, \theta]$ and there is a claim for 5, you immediately know that θ must be at least 5. A similar statement holds for a single parameter Pareto model with prior parameter θ , as the next example illustrates.

[1/3/2019] On page 1162, in the solution to question 12, in the table, change the entry for AY1 development year 3 from 100.0% to 10.0%.

[1/2/2019] On page 1232, in the solution to question 25, change the last term in the formula from $\frac{\sum(\theta/x_i)^\tau}{\ln(\theta/x_i)}$ to $\sum(\theta/x_i)^\tau \ln(\theta/x_i)$.

- [12/25/2018] On page 1179, in the solution to question 32, on the third line from the end, change “greater than or equal to 2” to “less than 2”.
- [12/24/2018] On page 130, in the solution to exercise 8.7, on the line below the table, change AY3 to AY4.
- [12/23/2018] On page 118, in Table 8.3, change 12.1609 (for AY3) to 12.0426.
- [12/19/2018] On page 260, in the solution to exercise 16.6, on the ninth line, change equation (16.1) to equation (16.2).
- [12/16/2018] On page 424, in exercise 26.25, change answer choice B to 18.8.
- [12/10/2018] On page 343, in the solution to exercise 21.16, on the last line, put primes on the β s;

$$r\beta'(1 + \beta')$$

- [12/10/2018] On page 340, in Example 22D(iv), add “given θ ” after “independent” and before the period.
- [12/1/2018] On page 240, in exercise 15.6, on the second line, change “primary reinsurer’s” to “primary insurer’s”.
- [11/24/2018] On page 224, the first full paragraph is confusing. It says that each ILF calculation should only use data from policies at that limit or higher, yet Example 14B violates this. It instead should say that each LAS calculation should only use data from policies at that limit or higher. Replace the paragraph with the following paragraph:

In the previous example the sizes of all losses were known, but in practice the company would not know the sizes of losses above the limit. Therefore, you should compute the *limited average severity* (LAS) for the basic policy limit and the policy limit of interest. The limited average severity for a limit is the sum of limited losses, the minimums of loss sizes and policy limit, divided by the number of losses. For each LAS calculation, you should use data only from policies with the policy limit of interest or a higher policy limit; for policies with lower limits, you do not know the limited loss for policies at the policy limit. Since there will be different numbers of policies used in the calculation of limited losses, the number of losses used to calculate each LAS will not be the same.

- [11/24/2018] On page 232, change the answer key for exercise 14.5 to (E).
- [11/18/2018] On page 159, in the solution to exercise 10.14, on the second line, in the denominator, remove the parenthesis after 5000 and add a parenthesis after 1.5). The line should read

$$\frac{2,000,000 + 500,000}{500(5000(1) + (1000)(1.5))} = 0.769231$$

- [11/3/2018] On page 656, on the last line, change “Exam C” to “Exam STAM”.
- [10/30/2018] On page 120, on the line above the third table, change “We are using Table 8.3” to “We are using the table at the top of page 116”.
- [10/23/2018] On page 102, three lines below formula (7.1), change f to f_{ult} .
- [10/23/2018] On page 693, in the solution to exercise 38.14, on the last line, insert “=” between k and $\frac{1.96}{\sqrt{683}}$.
- [10/23/2018] On page 882, in the solution to exercise 48.24, on the ninth line, change v_2 to v_B .
- [10/19/2018] On pages 186–187, the solution to Example 12K is incorrect. Replace it with the following:

The payment per payment random variable Y^P has density $f_{Y^P}(x) = f_{Y^L}(x)/(1 - F(500))$, where Y^L is the payment per loss random variable, for $x > 500$. Therefore, $E[Y^P] = E[Y^L]/(1 - F(500))$ and $E[(Y^P)^2] = E[(Y^L)^2]/(1 - F(500))^2$. We’ll calculate variance as second moment minus first moment squared.

Split the first interval $(0, 1000)$ into two subintervals, $(0, 500]$ and $(500, 1000)$. The average payment in the first interval is 0 and in the second interval the average payment is 250. The probability that a loss will be in the second interval is $0.5(23)/50 = 0.23$. Similarly, the probabilities of the other three intervals are $16/50 = 0.32$, $6/50 = 0.12$, and $5/50 = 0.1$. The average payment per loss in those intervals is the midpoint, minus 500. So the overall average payment per loss is

$$E[(X - 500)_+] = 0.23(250) + 0.32(1000) + 0.12(3000) + 0.1(7000) = 1437.5$$

Also, $\Pr(X \leq 500) = 0.5(23)/50 = 0.23$, so the average payment per payment is $1437.5/(1-0.23) = \boxed{1866.88}$.

We'll calculate the second moment of payment per loss using equation (2.4) in each interval starting with the interval $(500, 1000)$.

$$E[(X - 500)_+^2] = \frac{0.23(500^2) + 0.32(500^2 + (500)(1500) + 1500^2) + 0.12(1500^2 + (1500)(4500) + 4500^2) + 0.10(4500^2 + (4500)(9500) + 9500^2)}{3}$$

$$= 6,644,166\frac{2}{3}$$

Therefore, the variance of payment per payment is

$$\frac{6,644,166}{0.77} - 1866.88^2 = \boxed{5,143,535}$$