Updates and Errata: ACTEX Study Manual for SOA Exam FM, Fall 2020 Edition
as of May 17, 2021

Please note the following errors in the Fall 2020 Edition of the manual.
In each case, the change is shown in red.

Page M1-70, Solution to Problem 1.
The last two lines of the solution should read as follows:

$$i = \frac{0.009 \pm \sqrt{0.009^2 - 4\times 1\cdot(-0.009)}}{2\times 1} = 0.0995,\ -0.0905$$

The problem states that $i > 0$, so $i = 9.95\%$."

Page M7-36, Example (7.64).
Beginning with the 2nd formula on this page, the rest of the page should read as follows:

"Modified Duration: $$\frac{A_2\cdot\frac{2}{1.044}}{1.044^2}+\frac{A_{12}\cdot\frac{12}{1.053}}{1.053^{12}}=\frac{(120{,}000)\cdot\frac{6}{1.05}}{1.05^6}$$

This reduces to a system of two equations in two unknowns:

$$0.91749\cdot A_2 + 0.53810\cdot A_{12} = 89{,}545.85$$
$$1.75763\cdot A_2 + 6.13215\cdot A_{12} = 511{,}690.56$$

The solution is: $A_2 = 58{,}493.08 \qquad A_{12} = 66{,}678.32$"

Now that we have found the face values (A_2 and A_{12}) needed to match the present values and durations of our assets and liabilities, we can check the convexity condition to see whether the portfolio is immunized:

$$\sum t(t+1)\cdot A_t\cdot v_{i_0}^{t+2} = 2\times 3\times\left(\frac{58{,}493.08}{1.044^4}\right)+12\times 13\times\left(\frac{66{,}678.32}{1.053^{14}}\right)=5{,}343{,}344.42$$

$$\sum t(t+1)\cdot L_t\cdot v_{i_0}^{t+2} = 6\times 7\times\left(\frac{120{,}000}{1.05^8}\right)=3{,}411{,}270.38$$

This shows that the convexity of the assets is greater than that of the liability. Thus the portfolio is immunized against a parallel shift in the yield curve."

Page M7-37, Exercise (7.65).
The answers should read as follows:

"Answers:" $A_5 = 56{,}817.10$, $A_7 = 63{,}481.60$

$\Sigma t\cdot(t+1)\cdot A_t\cdot v_{i_0}^{t+2} = 3{,}491{,}488.69 > \Sigma t\cdot(t+1)\cdot L_t\cdot v_{i_0}^{t+2} = 3{,}411{,}270.38$"

Page M7-37, Example (7.66).
The two formulas for Asset value should read as follows:

"For a 50bp shift upward, we have:

$$\text{Asset value} = \frac{58{,}493.08}{1.049^2} + \frac{66{,}678.32}{1.058^{12}} = 87{,}052.79$$

For a 50bp shift downward, we have:

$$\text{Asset value} = \frac{58{,}493.08}{1.039^2} + \frac{66{,}678.32}{1.048^{12}} = 92{,}172.54$$"

Page M7-37, Exercise (7.67).
In the Answers section, the Asset values should be as follows:

50 bp up:	Asset value = 87,030.47
50 bp down:	Asset value = 92,148.53

Page M7-39, Example (7.68).
The first formula should read as follows:

$$\text{Asset value} = \frac{58{,}493.08}{1.03^2} + \frac{66{,}678.32}{1.06^{12}} = 88{,}272.42$$

Page M7-39, Exercise (7.69).
In the Answers section, the Asset value should be 89,677.35.

Page M7-67, Problem 9.
The table of spot rates should be as follows:

Term (yrs.)	Spot rate
1	3.4%
2	4.4%
3	5.1%
4	5.5%
5	5.7%

Page PE3-2, Problem 7.
The second and third sentences should read as follows:
"For the first 6 years interest is credited at a nominal annual rate of 6% convertible monthly. For the next 4 years interest is credited based on a nominal rate of discount of 8% convertible quarterly."

Page PE5-4, Problem 19.
The third line of the first paragraph should begin:
"the first deposit will be 1,000."

Page PE5-12, Solution to Problem 3.
The value shown in the solution is correct, but the correct answer choice is D (not E).

Page PE5-18, Solution to Problem 28.
The equation at the end of the solution should be:

$$10{,}000/(1.06 \times 1.05 \times 1.04) = 8{,}639.16$$

Page PE10-3, Problem 9.
The answer choices for this problem should be as follows:

A) 15,156 B) 15,651 C) 16,156 D) 16,561 E) 16,651

Page PE10-11, Solution to Problem 5.
The second equation in this solution should be:

$$Price_0 = 1{,}000 \cdot \left(r \cdot \left[a_{\overline{8}|6.55\%} + 1.0655^{-8} \cdot a_{\overline{12}|5.4\%} \right] + 1.0655^{-8} \times 1.054^{-12} \right) = 11{,}293.88 \cdot r + 320.25$$

Page PE10-13, Solution to Problem 9.
The solution to this problem should read as follows:

"We know $d^{(4)} = 0.04$, so we can calculate the annual effective interest rate:

$$1 + i = \left(1 - \frac{0.04}{4}\right)^{-4} = 1.04102 \qquad i = 0.04102$$

The accumulated value in the account at time 5 is:

$$X \cdot \ddot{s}_{\overline{5}|4.102\%} = X \cdot \frac{1.04102^5 - 1}{0.04102/1.04102} = 5.6500 \cdot X$$

Because the total deposits are $5 \cdot X$, we know that the interest earned during the 5 years is $0.6500 \cdot X$. The problem states that 500 is earned during the first 5 years, so we have:

$$0.6500 \cdot X = 500 \qquad \rightarrow \qquad X = 500 / 0.6500 = 769.22$$

Now we can calculate the balance at the end of 15 years:

$$X \cdot \ddot{s}_{\overline{15}|4.102\%} = 769.22 \cdot \frac{1.04102^{15} - 1}{0.04102/1.04102} = 16{,}156.43$$

Answer: C

Page PE12-26, Solution to Problem 28.
The last equation in the solution should be:

$$1{,}200 \cdot {}_{20|}a^{(12)}_{\overline{10}|} = 1{,}200 \times 1.05862^{-20} \cdot \frac{1 - 1.05862^{-10}}{12 \cdot \left(1.05862^{1/12} - 1\right)} = 2{,}921.13$$