Errata and updates for ASM Exam MFE/3F (Eighth Edition) sorted by page.

Practice exam questions 10:10 and 10:15 are defective in that none of the answer choices is correct, and question 11:5 needs to be corrected as indicated in the note for page 628.

[3/5/2011] The information in the section "The normal distribution table" only applies to paper-and-pencil sites. For students taking the exam under CBT, replace that section with the following:

Formulas in this course use the normal distribution. Most students will be taking this exam at a Prometric site. Prometric provides a standard normal distribution calculator. See `http://www.prometric.com/SOA/MFE3F_calculator.htm` to see how this works. The calculator provides values of the cumulative normal distribution function and its inverse to 5 decimal places.

In addition, you will be given a formula sheet. See

`http://www.prometric.com/SOA/MFE3F_calculator.htm`

for this sheet. It provides the standard normal density function, the lognormal density function, and moments of the lognormal distribution.

This edition of the manual was written before the Prometric calculator was introduced, and therefore uses the former rounding rules of the SOA, as listed in the section of the manual these paragraphs are replacing.

[8/30/2011] On page 6, third line, change 's to seller's.

[5/13/2011] On page 6, under **Bull spreads**, "To create a bull spread with puts", item 2, change $K_1 - S_T$ to $K_2 - S_T$.

[3/21/2011] On page 8, one line below the last displayed line, change "K_3 and K_3" to "K_1 and K_3".

[11/23/2010] On page 42, on the last line of the first paragraph, $S_t > K$ should be $S_t > K_3$.

[8/17/2011] On page 43, in the enumerated list before the exercises, item 1, change $S - K_1$ to $S - K_2$.

[12/1/2011] On page 54, on the line before Quiz 3-2, change "borrow" to "lend".

[1/21/2012] On page 56, on the fifth line from the bottom of the page, change $109e^{0.1}$ to $109e^{-0.1}$.

[3/5/2011] On page 140, replace the first three sentences of the paragraph beginning "Let's generalize" with the following:

Let's generalize from a 1-year period to a t-year period. In our lognormal model, if the parameters of the lognormal distribution for S_1/S_0 are $m = \mu = \alpha - 0.5\sigma^2$ and $v = \sigma$, then the parameters of the lognormal random variable S_t/S_0 are $m = \mu t = \alpha t - 0.5\sigma^2 t$ and $v = \sigma\sqrt{t}$.

[1/20/2011] On page 142, on the first line of the answer to Example 7C, change "in Section 7.1" to "on the previous page".

[4/24/2011] On page 149, in equation (7.6), put a hat on d_2: $N(-\hat{d}_2)$.

[11/2/2011] On page 152, in the solution to exercise 7.2, on the first line, change "lognormal" to "normal" in two places.

[2/18/2011] On page 154, the solution to exercise 7.11 uses equation (7.6) (not (7.5)) and the solution to exercise 7.12 uses equation (7.9) (not (7.8)).

[9/27/2011] On page 164, on the first line of Table 8.2, change x_i to S_i.

[3/15/2011] On page 164, exercise 8.2 is identical to exercise 6.11.

[9/27/2011] On page 165, change the first sentence of exercise 8.4 to

A stock's price follows a lognormal model.

[3/8/2011] On page 216, in the solution to exercise 10.11, on the fifth line in the denominator change $N(0.1)$ to $N(-0.1)$.

[5/15/2011] On page 231, in the displayed formula, change the summation index from i to t.

[3/26/2011] On page 243, 2 lines above Example 12B, change 4.1474 to 4.1874.

[4/24/2011] On page 268, on the third line from the end of the solution to exercise 12.27, change the + before the c to −. On the following line, delete the minus signs:

$$c = \frac{e^{-0.25(0.02)}(0.4207)}{e^{-0.02}(0.3446)} = 1.2393$$

[3/26/2011] On page 276, three lines below equation (*), replace "is also lognormal" with "is normal".

[3/16/2011] On page 296, in the solution to exercise 13.12, on the third line, delete the 0 from express0ed. On the sixth line, replace 0.00402 with 0.0042.

[4/29/2011] On page 312, on the first displayed line of Subsection 14.2.3, $Se^{-\delta t}$ should be $Se^{-\delta T}$.

[5/4/2011] On page 316, on the fifth line of Example 14G, delete "at-the-money" and add "with strike price 50" after "put options".

[3/4/2011] On page 318, 4 lines above Quiz 14-5, change $S_0e^{-\delta t}$ to $S_0e^{-\delta T}$.

[3/15/2011] On page 332, in the solution to exercise 14.11, in the numerator of the displayed line, change $-0.1S$ to $0.1S$; delete the minus sign.

[3/16/2011] On page 369, in Section 16.3, on the line below equation (*), change $X(t)$ to $X(t)/X(0)$.

[1/12/2011] On page 370, on the second line of Section 16.4, change $\mathrm{d}Z(t)$ to $Z(t)$.

[2/25/2011] On page 371, in Example 16D, on the second line, change $Z(2)$ and $Z(7)$ to $X(2)$ and $X(7)$. In the answer, change $\mathrm{Cov}\big(Z(2),Z(7)\big)$ to $\mathrm{Cov}\big(X(2),X(7)\big)$

[9/27/2011] On page 381, on the second displayed line of the answer to Example 17A, the first expression should be

$$\Pr\left(\ln\frac{S(t)}{S(0)} > \ln 1.05\right)$$

[2/28/2011] On page 390, three lines above Quiz 18-3, insert $\mathrm{d}t$ after the large right parenthesis.

[2/27/2011] On page 391, exercise 18.1 should be moved to lesson 23.

[3/17/2011] On page 392, in exercise 18.7, on the first line, $S(t)$ should be in the exponent: $e^{S(t)}$.

[3/21/2011] On page 404, in the solution to exercise 19.5, five lines from the end, a 5 is missing from the right-hand side, which should be $5rS^3e^{\gamma t}$.

[10/25/2011] On page 404, in the solution to exercise 19.6, the expression for V_t on the second line should have $S(t)^{0.5}$ instead of $S(t)$, so

$$V_t = 0.055S(t)^{0.5}e^{0.055t}$$

Similarly, on the fourth line, change the term before the equals sign to $0.055S(t)^{0.5}e^{0.055t}$.

[1/29/2011] On page 404, the final answer to exercise 19.6 should be 0.6 instead of 0.06.

[3/12/2011] On page 409, in Example 20C, change the denominators of the left sides of the two equations to $S(t)$ and $Q(t)$ respectively.

[2/25/2011] On page 418, in exercise 20.18(iii), change 0.2 to 0.3. In (iv), change 0.3 to 0.2.

[4/1/2011] On page 421, in the solution to exercise 20.11, on the last line of the page, change $\text{Var}(S-Q)$ to $\text{Var}(\ln S - \ln Q)$.

[3/15/2011] On page 428, on the last line of the answer to Example 21E, the value of φ (0.6) is missing, and the final answer is incorrect. Replace the line with

$$= 0.6(0.02) - 0.03 + 0.4\Big(0.04 + 0.5(0.6)(0.25^2)\Big) = \boxed{\mathbf{0.0055}}$$

[3/9/2011] On page 432, in the solution to exercise 21.5, change $\ln 40$ (third line) to $\ln 100$, change 3.723879 to 4.640170 (third and fourth lines), change 13.87728 to 21.54118 (5th and 6th lines) and change the final answer to 20.69654.

[10/9/2011] On page 434, 4 lines above Quiz 22-1, add $\mathrm{d}t$ at the end of the line.

[1/13/2011] On page 434, 4 lines above Quiz 22-1, replace the second equals sign with a plus sign. On the next line, add an equals sign after $\mathrm{d}S/S$: $\mathrm{d}S/S = (\alpha-\delta)\mathrm{d}t + \sigma\,\mathrm{d}Z(t)$.

[8/26/2011] On page 434, 2 lines above Quiz 22-1, replace Y at the end with $\mathrm{d}t$ and put a $\mathrm{d}t$ after the second summand, so that the line reads:

$$\frac{\mathrm{d}Y}{Y} = \frac{aS}{S}\Big((\alpha-\delta)\mathrm{d}t + \sigma\,\mathrm{d}Z(t)\Big) + 0.5a(a-1)\sigma^2\mathrm{d}t - \Big(a(r-\delta) + 0.5a(a-1)\sigma^2\Big)\mathrm{d}t$$

[3/9/2011] On page 437, in question 22.2, change the last line to "Calculate the price of the option at time 0."

[3/9/2011] On page 443, the solution to exercise 22.13 is incorrect. The correct solution is as follows. In this solution, in light of the new Prometric normal calculator, the normal distribution is calculated to five decimal places.

Delta is the partial derivative of the option price C with respect to the stock price, or by the chain rule:

$$\Delta_C = \frac{\partial C}{\partial S} = \frac{\partial C}{\partial Y}\frac{\mathrm{d}Y}{\mathrm{d}x}$$

where $Y = S^3$. We know from calculus that $\mathrm{d}Y/\mathrm{d}X = 3S^2 = 3(30^2) = 2700$. Let's work on $\partial C/\partial Y$.

From Black-Scholes formula, we know that $\partial C/\partial Y = e^{-\delta t}N(d_1)$, where δ is negative the prepaid forward rate and d_1 is calculated based on Y's prepaid forward rate ($-\delta$ in the formula for d_1) and volatility. The prepaid forward rate for Y is the exponent in formula (22.3):

$$-rT + \Big(a(r-\delta) + 0.5a(a-1)\sigma^2\Big)T = -0.04 + 3(0.04) + 0.5(3)(2)(0.25^2) = 0.2675$$

The volatility of Y is three times the volatility of S, or $3(0.25) = 0.75$. So d_1 is

$$\begin{aligned} d_1 &= \frac{\ln(Y/K) + r - \delta + 0.5\sigma^2}{\sigma} \\ &= \frac{\ln(30^3/30^3) + 0.04 + 0.2675 + 0.5(0.75^2)}{0.75} = 0.785 \end{aligned}$$

Therefore $N(d_1) = N(0.785) = 0.78377$. Finishing up,

$$\frac{\partial C}{\partial Y} = e^{0.2675}(0.78377) = 1.02415$$

$$\Delta = 2700(1.02415) = \boxed{\mathbf{2765}}$$

[3/12/2011] On page 446, in the answer to Example 23D, on the second line at the end, change $\mathrm{d}\left(Z(t)^2\right)$ to $\mathrm{d}\left(0.5Z(t)\right)^2$.

[3/13/2011] On page 447, on the line above equation (23.1), change "0 to t" to "0 to T".

[11/9/2011] On page 450, on the 6th displayed line of the page, there should be a $\mathrm{d}t$ at the end of the line, so that the line looks like this:

$$\mathrm{d}X(t)=\left(-\lambda X(0)e^{-\lambda t}+\alpha\lambda e^{-\lambda t}\right)\mathrm{d}t+e^{-\lambda t}\mathrm{d}\left(\int_0^t \sigma e^{\lambda s}\mathrm{d}Z(s)\right)-\left(\lambda e^{-\lambda t}\int_0^t \sigma e^{\lambda s}\mathrm{d}Z(s)\right)\mathrm{d}t$$

[4/1/2011] On page 453, in the solution to exercise 23.2, on the second displayed line, change $Z(t)\mathrm{d}t$ to $Z(t)\mathrm{d}Z(t)$. On the next line, make the same change, and after " anti-derivative of $Z(t)$ add $\mathrm{d}Z(t)$.

[5/15/2011] On page 462, one line before Subsection 24.2.2, change "they could" to "that could".

[11/9/2011] On page 464, on the last line of the warning box, change "year n" to "year k".

[3/22/2011] On page 469, in exercise'24.15, on the last line, replace year-3 with year-4.

[3/15/2011] On page 483, in exercise 25.9, on the last line, replace year-2 with year-3.

[3/15/2011] On page 486, the solution to exercise 25.9 is incorrect. Replace all lines past the first two with

$$d_1=\frac{\ln\left(0.959034(1.04)\right)+0.5(0.05^2)(2)}{0.05\sqrt{2}}=-0.00153 \qquad N(-d_1)=N(0.00153)=0.50061$$

$$d_2=-0.00153-0.05\sqrt{2}=-0.07224 \qquad N(-d_2)=N(0.07224)=0.52880$$

$$\text{Put}=0.952\left(\frac{0.52880}{1.04}-0.959034(0.50061)\right)=0.02699$$

Multiplying by 1.04, the caplet's price is $0.02699(1.04)=$ **0.02807**.

[3/4/2011] On page 489, in the table, two lines under the heading in the 4% scenario column, change -2.608747 to -2.608074.

[1/25/2011] On page 494, on the fifth line, change page 26.2.1 to page 491.

[5/22/2011] On page 496, the formula for $A(t,T)$ when $a=0$ (the fourth displayed line from the bottom of the page) is incorrect; there should be a negative sign before 0.5 in the exponent. However, McDonald has this erroneous formula, and has not corrected it, so you are probably not expected to know the correct formula.

[4/10/2011] On page 498, on the line above Subsection 26.2.4, replace the right parenthesis at the end of the line with a period.

[3/23/2011] On page 500, 3 and 1 lines above Subsection 26.2.5, change $(a-\bar{\phi})/a$ to $a/(a-\bar{\phi})$. Also, 3 lines above Subsection 26.2.5, change $\sqrt{(r)}$ to $\sqrt{r}$.

[4/24/2010] On page 508, change equation (26.19) to

$$P(r+\epsilon,h,T)-P(r,0,T)=\Delta\epsilon+0.5\Gamma\epsilon^2+\theta h$$

[5/22/2011] On page 522, in the solution to exercise 26.28, on the second line, the exponent is based on the formula in McDonald, but McDonald's formula is erroneous; there should be a negative sign before $0.5\sigma\phi(5^2)$. This has no effect on the solution since $\phi=0$. Since McDonald has not corrected this error, it is unlikely you would be expected to know the correct formula.

[3/25/2011] On page'579, question 6:9 is the same as question 4:7.

[4/3/2011] On page 590, in question 11, on the sixth line, replace "continuously" with "continuous".

[5/11/2011] On page 598, in question 5, on the line below the graph, replace year-3 with year-4.

[3/25/2011] On page 602, question 8:16 is the same as question 2:26.

[5/24/2011] On page 605, in question 29, replace the first sentence with

Let $S(t)$ be the time-t value of a stock index, and $Q(t)$ the time-t value of an annuity contract. The annuity's contract value grows at the same rate as the value of the stock index, except that a continuously compounded 1% management fee is assessed. More precisely,

$$Q(t+\mathrm{d}t) = Q(t)\left(\frac{S(t+\mathrm{d}t) - 0.01S(t)\mathrm{d}t}{S(t)}\right)$$

[4/5/2011] On page 614, in question 26, on the first displayed line, change $\sqrt{r}$ to $\sqrt{r(t)}$. On the second displayed line, change B to $\Big(r(0)+B\Big)$ and change $\sqrt{r(t)}\,\mathrm{d}Z(t)$ to $\sqrt{r(s)}\,\mathrm{d}Z(s)$.

[4/5/2011] On page 620, in question 10, On the second line, add after "bond" before the comma: "maturing for 100".

[4/8/2011] On page 622, in question 18, delete the first sentence. This derivative security could not exist under the Black-Scholes framework with constant σ unless $\sigma = 0$.

[4/5/2011] On page 623, in question 21, on the seventh line, add the words "the variance of" before "control variate".

[3/25/2011] On page 626, question 10:30 is the same as question 4:11.

[5/9/2011] On page 628, in question 5, change "3 months" on the first line to "6 months", and change "6 months" on the third line to "3 months".

[5/11/2011] On page 639, in the solution to question 13, on the last two lines, $0.06Y(t)^{2/3}\mathrm{d}Z(t)$ should be $0.6Y(5)^{2/3}\mathrm{d}Z(t)$. The error occurs once per line. Do not change the first 0.06 on the last line.

[3/25/2011] On page 641, the answer key for questions 15, 16, and 17 should be DCB.

[11/10/2011] On page 644, the solution to question 15 is incorrect. The correct solution is

The prepaid forward price of currency, as indicated in Table **??**, is

$$x_t e^{-r_f(T-t)}$$

Here, for dollars in terms of euros, $x_t = 1/1.50$ and dollars are the foreign currency so $r_f = 0.04$. Also, $T-t=2$. We conclude that the prepaid forward price is $100e^{-0.04(2)}/1.50 = \boxed{\mathbf{61.54}}$.

[12/30/2010] On page 646, in the solution to question 22, on the first displayed line, change $(0.12-0.02)$ to 0.10. On the 3rd line from the end, replace $0.12-0.02$ with 0.10.

[4/10/2011] On page 653, in the solution to question 14, on the first displayed line, change $\dfrac{F_{0,1}\left(S(1)^2\right)}{S(1)^{-1}}$ to $\dfrac{F_{0,1}\left(S(1)^{-1}\right)}{S(0)^{-1}}$. On the second displayed line, change the denominator to $S(0)^2$.

[3/7/2011] On page 660, the answer to question 4 should be (E). Change the answer key on page 658 as well.

[3/7/2011] On page 662, in the solution to question 12, on the third line, change -0.5156 to -0.5126.

[5/6/2011] On page 664, in the solution to question 19, on the last line, $0.10\,\mathrm{d}Z(t)$ should be $0.10k\,\mathrm{d}Z(t)$.

[4/10/2011] On page 665, in the solution to question 20, 4 lines from the end, replace $Se^{-\delta}/Ke^{-r} = 0$ with $Se^{-\delta}/Ke^{-r} = 1$.

[4/28/2011] On page 673, in the solution to question 14, on the second line, add "t" before $+0.10Z(t)$.

[3/7/2011] On page 682, in the solution to question 15, 4 lines from the end, $N(0.11)$ should be $N(-0.11)$.

[4/1/2011] On page 690, in the solution to question 7, on the second line from the end, change $+0.1\,\mathrm{d}Z(t)$ to $-0.1\,\mathrm{d}Z(t)$.

[11/4/2011] On page 693, in the solution to question 15, the column S_t/S_{t-1} is incorrect, except that 1.0025 is correct. The five entries in that column should be 1.0025, 1.0948, 0.9180, 0.9429, 1.0579.

[5/10/2011] On page 701, in the solution to question 5, on the 8th line, change $\sqrt{0.5}$ to $\sqrt{0.25}$.

[5/11/2011] On page 705, in the solution to question 16, on the last two lines, $0.06Y(t)^{2/3}\mathrm{d}Z(t)$ should be $0.6Y(5)^{2/3}\mathrm{d}Z(t)$. The error occurs once per line. Do not change the first 0.06 on the last line.

[4/26/2011] On page 712, in the answer key, the answers to 5–10 should be BDCCDD. The answer to 15 should be A.

[4/26/2011] On page 716, in the solution to question 8.15, $N(\hat{d}_2)$ on the first line should be $N(-\hat{d}_2)$, resulting in changes to the following lines but no change to the final solution. Replace the first 7 lines of the solution with the following (expanded to 5 decimal places in accordance with the new normal calculator):

The probability of payoff is therefore $N(-\hat{d}_2)$ where $\hat{d}_2$ is computed with $K=48$, the trigger price.

$$N(-\hat{d}_2)=0.25$$
$$\hat{d}_2=0.67449$$
$$\frac{\ln(50/48)+\left(0.08-0.5(0.2^2)\right)t}{0.2\sqrt{t}}=0.67449$$
$$0.06t-0.1349\sqrt{t}+\ln(50/48)=0$$
$$\sqrt{t}=\frac{0.1349\pm\sqrt{0.1349^2-4(0.06)\left(\ln(50/48)\right)}}{0.12}=0.3604,1.888$$
$$t=\boxed{\textbf{0.13}},3.56 \qquad \textbf{(A)}$$

[3/7/2011] On page 725, in the solution to question 10, on the fourth line, replace 0.4588 with 0.4589.

[4/5/2011] On page 731, in the solution to question 26, on the last displayed line, change two $r(t)$'s in exponents to t.

[4/5/2011] On page 736, the solution to question 10 is incorrect. The correct solution is

The cap rate is 4% for half a year, so the strike price for the put is $K=1/1.04=0.961538$. The option has a 2-year expiry, so we use $t=2$ in the Black formula.

$$d_1=\frac{\ln(0.9650(1.04))+0.5(0.08^2)(2)}{0.08\sqrt{2}}=0.08833 \qquad N(-d_1)=N(0.08833)=0.46481$$
$$d_2=0.08833-0.08\sqrt{2}=-0.02481 \qquad N(-d_2)=N(-0.02481)=0.50990$$
$$P=0.8220\left(\frac{0.50990}{1.04}-(0.9650)(0.46481)\right)=0.03431$$

Then we multiply by 1,000,000 and by $1+K_R=1.04$: 1,040,000(0.03431) = $\boxed{\textbf{35,687}}$.

[4/5/2011] On page 737, in the solution to question 12, on the last line, change 62.0408 to 62.0202 in two places. Change the final answer to 161.24.

[5/14/2011] On page 737, in the solution to question 13, on the 5th displayed line, delete the minus sign. On the 6th displayed line, delete 0.04 from the first denominator.

[3/7/2011] On page 738, in the solution to question 15, on the line under the table, change $\max(x_i - 1.4, 0)$ to $\max(1.5x_i - 1.4, 0)$.

[11/5/2011] On pages 738–739, in the solution to question 15, the payoffs should be discounted at 0.02. The multiplication by $e^{-0.02}$ may be postponed to the end, however, since multiplying the five payoffs by $e^{-0.02}$ will multiply the standard deviation by $e^{-0.02}$. Therefore, replace the last phrase of the solution, "then take the square root…" with "then take the square root and multiply by $e^{-0.02}$ to get the standard deviation of the call option price, $e^{-0.02}\sqrt{0.000020272} = \boxed{\mathbf{0.0044}}$. None of the five answer options are correct.

[3/9/2011] On page 741, in the solution to question 22, on the fifth and sixth lines, change 0.01905 to −0.01905 and 0.04905 to 0.04095. This sentence is intended to explain the formula for d_1 near the end of the solution. d_1 is a sum of −0.01905 (which is the log of the underlying asset, $S(1)^{0.7}$) and the risk-free rate of 0.06.

[5/15/2011] On page 742, in the solution to exercise 24, 4 lines after the boldface answer key **(B)**, change the last exponent from 0.90 to 0.09.

[5/14/2011] On page 746, in the solution to question 3, on the last displayed line, change $0.12Y^2$ to $0.03Y^2$.

[5/9/2011] On page 747, in the solution to question 5, on the first displayed line, change all 6's appearing as third arguments to 3's (there are six of them). On the sixth line, change "3 months" to "6 months". On the second displayed line, delete $e^{-0.05}$ and change the $C(50,60,6)$ to a $C(50,60,3)$.

[4/6/2011] On page 754, in the solution to question 27, on the last two lines (once apiece), change $\alpha(0.04,0,2)$ to $\alpha(0.04,0,3)$.

[11/15/2011] On page 754, on the first line of the solution to question 28, change "put" to "call".

[3/9/2011] On page 773, in the solution to question 12II, on the third line, change $P(45,T) > P(50,T)$ to $P(45,T) \leq P(50,T)$.

[4/10/2011] The url on page 777, second line of Section B.6, should be

`http://www.beanactuary.org/exams/pdf/MFE_SampleQS1-76.pdf`

[10/10/2011] On page 802, the answer key for question 69 should be **(C)** rather than **(A)**.