

## Errata and Updates for ASM Exam MFE/3F (Sixth Edition) Sorted by Page

Warning: Practice Exam 1:11, 1:21, 2:19, 7:11, 7:22, 9:17, and 10:7 should be changed as indicated below. Practice Exam 3:11 and 10:16 are defective in that none of the 5 answer choices is correct. Practice Exam 4:14 is defective and not easily repaired.

[8/30/2009] On page x, here's an updated Table 1 including the sample questions added in August 2009:

Topic	Textbook chapters	Manual lessons	Number of questions			
			CAS		SOA	
			Spring 2007	Fall 2007	Sample questions	Spring 2007
Put-call parity and related material	9	1–2	4	5	3	1
Binomial trees	10–11	3–6	4	4	8	4
Lognormal model	18	6–30	0	0	2	0
Black-Scholes	12	9–11	2	4	7	4
Delta hedging	13	12	2	1	3	2
Exotic options	14	13–14	1	3	12	2
Monte Carlo valuation	19	??	0	0	4	0
Itô processes	20–23	16–17	1	0	13	2
Interest rate models	24	18–20	2	0	8	3
Not on syllabus			0	0	0	1
Total questions			16	17	60	19

[7/2/2009] On page xi, on the last line, change 0.8859 to 0.8860.

[6/8/2009] On page xii, in the last sentence of the first paragraph under “Errata”, change 5th edition to 6th edition.

[6/3/2009] On page 8, the first sentence of the second paragraph under “Collars” is a little unclear, and should be replaced by:

A collar’s payoff increases as the price of the underlying stock decreases below  $K_2$  and decreases as the price of the underlying stock increases above  $K_1$ . Between  $K_2$  and  $K_1$ , the payoff is flat.

[7/8/2010] On page 8, at the end of the first sentence (after “put”), add “both of them at-the-money ( $K = S_0$ ).”

[11/22/2009] On page 10, in the second bullet, change “exercise” to “exercises”.

[6/10/2009] On page 13, in Subsection 1.2.3, the first displayed equation should have a + sign on  $P(S, k, t)$ . On the next line, change “buy a European” to “sell a European”.

[11/22/2009] On page 24, in the solution to quiz 1-3, on the first displayed line, change  $e^{-rt}$  to  $e^{-rT}$ .

[7/16/2009] On page 28, 4 lines above the heading “Call options on non-dividend paying stocks”, change “So selling” to “So buying”.

[11/22/2009] On pages 29-30, in all displayed equations, the last argument of  $P$  and  $C$  should be  $T - t$  instead of  $T$ . This affects ten  $T$ ’s, seven on page 29 and three on page 30.

[7/2/2009] On page 44, the solution to exercise 2.1 is incorrect. The correct solution is

- I. By put-call parity  $P(S, 35, T) - C(S, 35, T) = 35e^{-rT} - 35e^{-\delta T}$ , and  $C(S, 35, T) \geq 0$ , so  $P(S, 35, T) \geq 35e^{-rT} - 35e^{-\delta T}$ . ✓
- II. By put-call parity  $P(S, 30, T) - C(S, 30, T) = 30e^{-rT} - 35e^{-\delta T}$ , and  $P(S, 35, T) \geq P(S, 30, T)$ . ✓
- III. Since  $P(S, 35, T) - C(S, 35, T) = 35e^{-rT} - 35e^{-\delta T}$  and  $C(S, 30, T) \geq C(S, 35, T)$ , the inequality should be reversed:  $P(S, 35, T) - C(S, 30, T) \leq 35e^{-rT} - 35e^{-\delta T}$ . ✗

[7/20/2009] On page 45, in the solution to exercise 2.9, on the third line, change 70-strike to 75-strike.

[11/22/2009] On page 56, 3 lines from the end of the answer, change  $ds$  to  $dS$ .

[7/23/2009] On page 57, in Table 3.1, in the 5th formula, move  $h$  into the exponent:  $e^{(r-\delta)h}$ .

[1/6/2010] On page 74, on the line below the table, change “ending call” to “ending put”.

[11/22/2009] On page 79, 3 lines above Example 4E, replace  $e^{(r-\delta)h}$  with  $Se^{(r-\delta)h}$ .

[8/26/2009] On page 80, on the fifth line, remove one of the two equal signs after  $F_u$ .

[7/28/2009] On page 82, in exercise 4.1, on the first line, delete “based on forward rates,”.

[11/22/2009] On page 95.16, in the caption of Figure 4.11, change Binary to Binomial.

[11/22/2009] On page 95, in the solution to exercise 4.18, the fourth word should be “is”.

[8/26/2009] On page 105, 4 lines from the bottom, move the large parenthesis after  $(1 - 0.425197)$  to after  $(1.08)$  so that the line reads

$$e^{-0.0075} (0.365304(34.88) + (1 - 0.365304)(1.08)) = e^{-0.25\gamma} (0.425157(34.88) + (1 - 0.425157)(1.08))$$

[9/23/2009] On page 106, on the fourth displayed line of the page, the last large right parenthesis should be moved from after 0.425157 to after 0.39158:

$$e^{-0.0075} (0.365304(14.6) + (1 - 0.365304)(0.39158)) = e^{-0.25\gamma} (0.425157(14.6) + (1 - 0.425157)(0.39158))$$

[9/23/2009] On page 113, in the solution to exercise 5.3, on the third displayed line, the denominator’s exponent  $0.03\sqrt{0.5}$  should be  $0.3\sqrt{0.5}$ .

[8/20/2009] On page 113, in the solution to exercise 5.4, replace the formula for  $p$  with

$$p = \frac{e^{(\alpha-\delta)h} - e^{(r-\delta)h - \sigma\sqrt{h}}}{e^{(r-\delta)h + \sigma\sqrt{h}} - e^{(r-\delta)h - \sigma\sqrt{h}}}$$

[7/28/2009] On page 113, in the solution to exercise 5.5, on the third line, replace “ $p^*$  and  $p$ ” with “ $1 - p^*$  and  $1 - p$ ”. On the fourth line, replace  $\alpha h = -0.025$  with  $\alpha h = 0.5\alpha$ . On the second displayed line, replace the  $e^{-0.02}$  on the left hand side with  $e^{0.5\alpha}$ , and the exponent  $0.2 - 0.2\sqrt{0.5}$  on the right hand side with  $0.2 + 0.2\sqrt{0.5}$ .

[12/14/2009] On page 119, on the sixth line of the “Lognormal tree” paragraph, change  $\sigma h$  to  $\sigma\sqrt{h}$ .

[9/6/2009] On page 123, on the last line of the page, change “Sample:6” to “Sample:17”.

[7/22/2009] On pages 129–133, the manual uses the phrase “interest rate” for the increase in stock price on page 129, and “continuously compounded expected rate of return” on page 133. However, there are some inaccuracies in the explanation.

The total return of a stock has two components: the increase in stock price and the dividends. Thus, the definition on page 133 of rate of return is inaccurate since it only considers the increase in the stock price. The second sentence of Section 7.2 should be changed to “The *continuously compounded expected growth rate of a stock’s price* is the logarithm. . .”. The continuously compounded expected rate of return should be defined as  $\alpha$ .

On page 129, “interest rate” is meant to be the random variable  $\ln(S_t/S_0)$ . However, once again, it only considers growth in stock price, not the total return on the stock which would include dividends.

- [8/31/2009] On page 129, on the last line,  $\sigma$  is missing in the denominator, which should be  $\sigma\sqrt{2\pi}$ .
- [8/27/2009] On page 130, on the 3rd line of the 4th paragraph of Subsection 7.1.2, replace  $e^{0.15-0.5(0.3^2)}$  with  $40e^{0.15-0.3^2}$ .
- [2/15/2010] On page 132, in Table 7.1, four lines from the bottom, change  $-m$  to  $+m$ .
- [2/18/2010] On page 139, in exercise 7.2, on the last line, add the words “over a period of one year” after “the rate of return”.
- [7/2/2009] On page 140, in Table 7.3, the first formula should have  $(\mu + 0.5\sigma^2)t$  instead of  $(\mu - 0.5\sigma^2)t$  in the exponent.
- [7/29/2009] On page 143, in the solution to exercise 7.2, the final answer should be 0.5596.
- [7/25/2009] On page 143, in the solution to exercise 7.5, on the first line, remove the parentheses:  $\mu = 0.15 - 0.02 - 0.3^2/2$ .
- [8/26/2009] On page 144, there are several minor errors in the solution to exercise 7.6. The corrected displayed lines are

$$\begin{aligned} \frac{-\ln 1.125 - 0.13x^2}{0.2x} &= N^{-1}(0.10) = -1.282 \\ 0.13x^2 - 0.2564x + 0.117783 &= 0 \\ x &= \frac{0.2564 \pm \sqrt{0.004494}}{0.26} = 0.7283, 1.2440 \\ t = x^2 &= \boxed{0.530, 1.548} \end{aligned}$$

- [9/15/2009] On page 149, in footnote 1, replace page 7.2 with page 134.
- [12/14/2009] On page 151, on the fourth line, replace “stock prices” with “stock returns”.
- [7/22/2009] On page 151, on the 9th line, change  $\mu + \sigma x_i$  to  $(x_i - \mu)/\sigma$ . On the 13th line, change  $\frac{2i-1}{n}$  to  $\frac{2i-1}{2n}$ .
- [10/31/2009] On page 151, in the first line of the table at the bottom of the page, replace 0.6874 with 0.6875.
- [8/18/2009] On page 170, in the solution to exercise 9.5, on the last line, replace 0.05 with 0.04 in three places.
- [8/18/2009] On page 173, the solution to exercise 9.13 is incorrect. The correct solution is

The futures period affects the forward price of the stock but does not affect the option price in any other way.

$$\begin{aligned} d_1 &= \frac{\ln(90e^{-0.06}/90e^{-0.06}) + 0.5(0.3^2)}{0.3} \\ &= \frac{0.045}{0.3} = 0.15 \\ d_2 &= 0.15 - 0.3 = -0.15 \end{aligned}$$

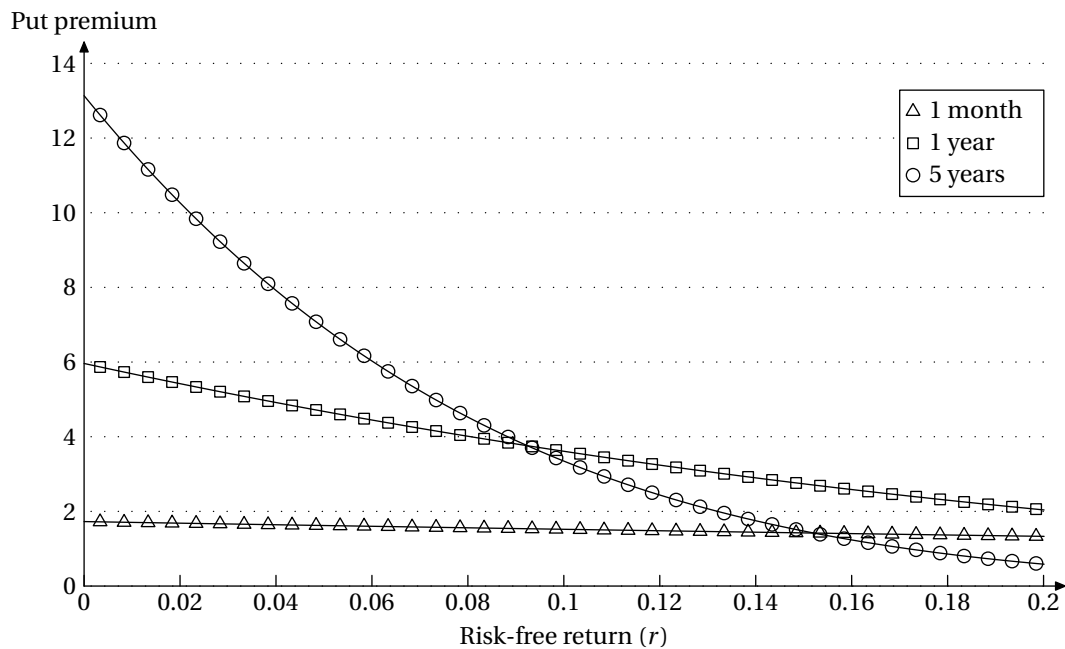
$$N(d_1) = N(0.15) = 0.5596$$

$$N(d_2) = N(-0.15) = 0.4404$$

$$C(F, 90, 1) = 90e^{-0.06}N(0.15) - 90e^{-0.06}N(-0.15) = \mathbf{10.10}$$

[12/14/2009] On page 182, on the second line (in  $Ke^{-rt}$ ) and third line (in  $Se^{-\delta t}$ ), change  $t$  to  $T$ .

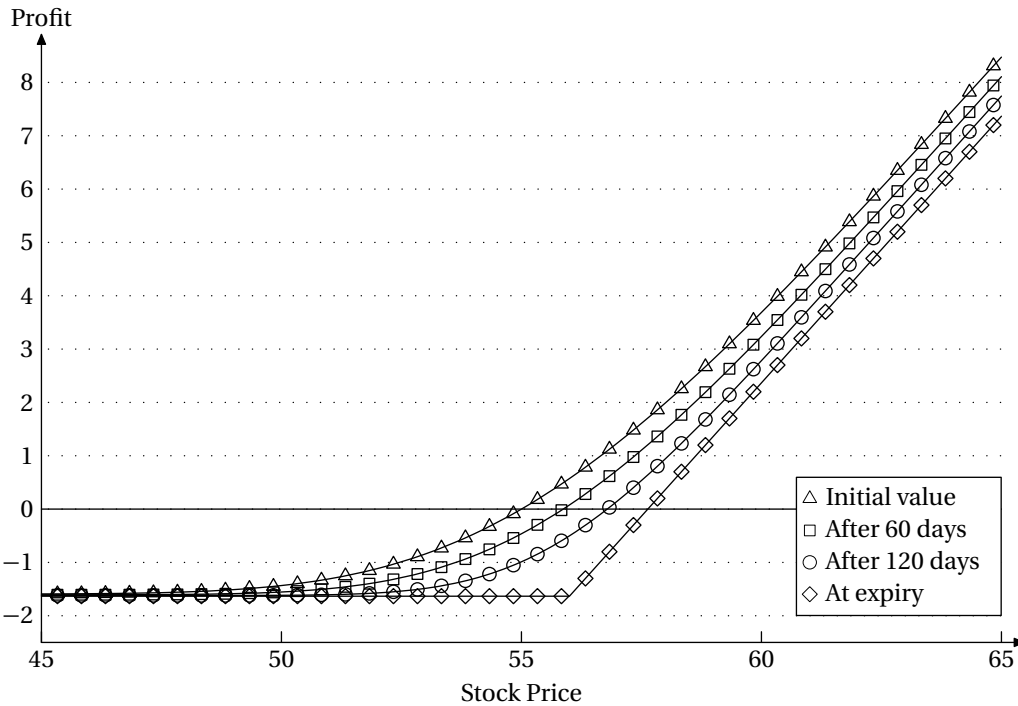
[12/5/2009] On page 189, in Figure 10.14, the vertical scale should be multiplied by 40. The correct figure is



[1/23/2010] On page 203, although the solution given to exercise 10.19 is mechanically correct, the information given is impossible, since delta for a put option should decrease, not increase, as an option is more in-the-money.

[3/17/2010] On page 206, in the solution to exercise 10.11, on the first line change “calculate” to “calculating”. On the fourth displayed line, change  $2(N - 0.1)$  to  $2N(-0.1)$ .

[12/5/2009] On page 214, Figure 11.2 is incorrect. The correct figure is



[8/14/2009] On page 224, in exercises 11.11–11.12, the last line should ask for the implied volatility *of the stock*, not the call or put option.

[5/12/2010] On page 243, replace the first sentence of exercise 12.5 with:

You are a market-maker and wrote a European option. You delta-hedged it with the underlying stock. You are given the following information for the put and the underlying stock:

[8/27/2009] On page 246, in exercise 12.15, on the last line, replace “option” with “stock”.

[8/15/2009] On page 250, in the solution to exercise 12.4, on the sixth displayed line, change  $-N(d_1)$  to  $-N(-d_1)$ .

[12/14/2009] On page 252, in the solution to exercise 12.11, on the first line, put a period after 1.66.

[7/6/2009] On pages 253–256, the solutions to 12.15–12.30 are misnumbered. The solution to 12.15 begins on page 253, 3rd line, “By the delta-gamma approximation...”. The solutions to 12.16–12.30 are numbered 12.15–12.29 respectively.

[12/14/2009] On page 253, in the solution to exercise 12.15 (second half of solution numbered 12.14), on the first displayed line, replace 0.09 with 0.0915.

[7/27/2009] On page 256, in the solution to exercise 12.25 (numbered 12.24), the final answer for  $x_1$  should be 0.2577, not 0.1963. Replace 0.1963 with 0.2577 on the second and third lines of the page.

[12/14/2009] On page 259, two lines below the second displayed equation, add the word “on” after “based”.

[12/14/2009] On page 262, on the line after the first display, change  $\ln S(0)$  to  $3\ln S(0)$ .

[12/14/2009] On page 270, on the last line of the page, change  $S_t$  to  $S_{t_1}$ .

[8/11/2009] On page 282, the solution to exercise 13.12 is incorrect. The correct solution is

As discussed in this lesson, if we let  $Q_t = S_t/S_{t-1}$ , we can express  $\ln U$  as

$$\ln U - \ln S_0 = \ln Q_1 + \frac{2}{3} \ln Q_2 + \frac{1}{3} \ln Q_3$$

The mean of  $\ln Q_i$  is  $(\alpha - \delta - 0.5\sigma^2)/12 = (0.10 - 0.04 - 0.5(0.36^2))/12 = -0.0004$ . The mean of the right hand side is  $-0.0004(1 + 2/3 + 1/3) = -0.0008$ . The variance is  $(0.36^2/12)(1 + 4/9 + 1/9) = 0.0168$ . Then the desired probability is the probability that  $\ln U - \ln S_0 > 0$ , or

$$\Pr(U > 80) = 1 - N\left(\frac{0.0008}{\sqrt{0.0168}}\right) = N(-0.01) = \boxed{0.4960}$$

[9/24/2009] On page 283, in the solution to exercise 13.22, on the second to last line, replace  $60 - 50 = 10$  with  $0.6 - 0.5 = 0.1$ .

[9/26/2009] On page 284, in the solution to exercise 13.23, on the last two lines, replace 4.896 with 4.8897 twice, and replace the final answer with 108.15.

[12/14/2009] On page 289, paragraphs 3 and 4: McDonald defines a cash-or-nothing option as one that pays 1 if the condition is satisfied. If an option paid  $c$ , it would be considered  $c$  cash-or-nothing options.

[12/14/2009] On page 293, on the last line of the page, add a period after “strike price”.

[6/13/2009] On page 297, in the answer to Example 14D part 2, in the parentheses, change  $-0.2646$  to  $-0.26406$ .

[2/5/2010] On page 299, on the 1st and 2nd lines of Section 14.3, interchange “call” and “put”: “. . . you may give (for a put option) or receive (for a call option). . .”.

[10/8/2009] On page 301, on the fourth line of the solution to Example 14G, change  $e^{0.06(0.75)}$  to  $e^{-0.06(0.75)}$ . On the second to last line of the solution to Example 14G, change  $P(S, 50e^{0.02}, 0.25)$  to  $P(S, 50e^{-0.02}, 0.25)$ .

[8/19/2009] On page 310, in the solution to exercise 14.2, on the fourth line, change  $c | S < c$  to  $c | S < K$ .

[8/14/2009] On page 320, change the second sentence of Example 15B to “The stock’s price increases at a continuously compounded rate of 0.10 and the stock’s volatility is 0.35.” The answer is incorrect and should be replaced with:

The lognormal parameter is  $0.10 - 0.5(0.35^2) = 0.03875$ . The inversion method gives  $z = N^{-1}(0.5910) = 0.23$ . Then  $n = 0.03875 + 0.35(0.23) = 0.11925$  and  $x = e^{0.11925} = 1.1267$ . The stock price  $S_1$  is therefore  $40(1.1267) = \boxed{45.07}$ .

[12/14/2009] On page 324, on the second line, replace “distribution” with “sample mean”.

[8/30/2009] On page 325, 4 lines from the bottom of the page, change  $\bar{A}$  to  $\bar{X}$ . In the footnote, delete the last sentence, in consideration of the fact that Sample Questions 58–59 deal with this topic. The interpretation of the puzzling statement in the McDonald textbook given in the manual is correct. Also note that Sample Question 56 deals with stratified sampling, the topic covered on page 326 of the manual.

[8/12/2009] On page 326, in the table. in the heading under “Normal number” change the first  $z_i$  to  $n_i$ .

[2/11/2010] On page 329, in exercise 15.5, add the words “nondividend paying” before “stock” on the first line.

[8/12/2009] On page 333, on the first line of the solution to exercise 15.1, change  $\nu^2$  to  $\sigma^2$ .

[9/15/2009] On page 334, in the solution to exercise 15.6, replace the first paragraph and the first sentence of the second paragraph with

The lognormal parameter for a 3-month period are

$$m = (0.05 - 0.03 - 0.5(0.15^2))(0.25) = 0.0021875$$

$$\nu = 0.15\sqrt{0.25} = 0.075$$

To save some work, let's calculate the normal random number that results in \$1.35, and skip the numbers below this one. We want  $1.40e^{0.0021875+0.075z} = 1.35$ , so

$$e^{0.0021875+0.075z} = \frac{1.35}{1.40}$$

$$0.0021875 + 0.075z = \ln(1.35/1.40)$$

$$z = \frac{(\ln(1.35/1.40)) - 0.0021875}{0.075} = -0.5141$$

Alas, all of our random numbers are above  $-0.5141$ , so no work was saved.

In the table, the heading of the second column should be  $x_i = 1.4e^{0.0021875+0.075z_i}$ .

- [8/22/2009] On page 335, in the solution to exercise 15.9, on the first and fourth lines, change 40.549 to 40.519.
- [10/8/2009] On page 336, in the solution to exercise 15.13, on the first displayed line, put a bar over  $X$ .
- [9/6/2009] On page 337, in the solution to exercise 15.15, two lines below the table, change 70(0.88803) to 68(0.88803).
- [10/8/2009] On page 337, in the solution to exercise 15.17, on the first displayed line, the denominator's  $Y$  should have a bar.
- [3/3/2010] On page 338, in the solution to exercise 15.19, on the top line of the table, 3rd column, change  $Z$  to  $Z_i$ . Also, on the first line under the heading of the third column, change 0.2667 to 0.0267. However, the table does not use the SOA rounding rules to compute the second column. The following table uses the rounding rules:

$u_i$	$Z_i$	$n_i = (0.10)(2) + (0.2\sqrt{2})Z_i$	$e^{n_i}$
0.27	-0.61	0.0275	1.0278
0.73	0.61	0.3725	1.4514
0.83	0.95	0.4687	1.5979
0.17	-0.95	-0.0687	0.9336
0.15	-1.04	-0.0942	0.9101
0.85	1.04	0.4942	1.6391

The final answer is then 1.26001 instead of 1.26007.

- [12/30/2009] On page 341, last line of page, note that  $X(t)$  has a scaled and shifted binomial distribution.  $0.5(X(t)+t)$  is binomial with the indicated parameters.
- [2/11/2010] On page 342, on the first line of Quiz 16-1, add at the end of the first sentence "with time measured in days".
- [7/29/2009] On page 343, in the first displayed equation, the left hand side should be  $X(t) - X(0)$ .
- [7/28/2009] On page 343, replace the first sentence of the third paragraph of Subsection 16.1.2 with  
If  $\ln(X(t)/X(0))$  is normal with mean  $\mu t$  and variance  $\sigma^2 t$ , then  $X(t)/X(0)$  is lognormal, and its mean is

$$E[X(t)/X(0)] = e^{\mu t + 0.5\sigma^2 t} \quad (*)$$

- [12/30/2009] On page 344, change "in" to "is" on the 2nd line and  $X(t)$  to  $X(t)/X(0)$  on the 6th line.
- [9/27/2009] On page 344, in the answer to Example 16C, two lines from the end, replace 0.06 with 0.6.

[10/17/2009] On page 345, one line below the fourth displayed line, change  $\alpha y$  to  $\xi y$ .

[12/30/2009] On page 345, 7 lines from the bottom, change  $\alpha$  to  $\mu$ .

[8/2/2009] On page 347, two lines above Example 16F, replace the phrase in quotes with “ $Y = \ln S(t)$  follows an Itô process  $dY(t) = \mu dt + \sigma dZ(t)$ ”.

[12/30/2009] On page 348, 3 lines from the bottom,  $C(50, 40, 1)$  should be  $C(40, 50, 1)$ .

[12/30/2009] On page 363, in Table 17.1, 3 lines from the end, change “an” to “and”.

[9/21/2009] On page 371, two lines above equation (17.11), change  $\alpha - \delta$  to  $\alpha - r$ .

[8/26/2009] On page 375, on the last line of the solution to Example 17Q, change the first plus sign to a minus sign:

$$= \left( -0.3 - \frac{0.02}{X(t)^2} \right) dt + \frac{0.2}{X(t)} dZ(t)$$

[8/30/2009] On page 377, on the last line of Table 17.3, change the last  $\alpha$ , the one before the integral, to  $\sigma$ .

[6/13/2009] On page 379, in exercise 17.10(iv), change 0.09 to 0.09t.

[11/1/2009] On page 382, in exercise 17.22, change the second-to-last line to “The risk-neutral process for  $S(t)$  is

$$\frac{dS(t)}{S(t)} = a dt + b d\tilde{Z}(t)$$

[12/13/2009] On page 385, in exercise 17.35, change  $dt$  to  $ds$  and  $dZ(t)$  to  $dZ(s)$ .

[8/30/2009] On page 386, in exercise 17.36, replace  $X_t$  with  $X(t)$ .

[6/13/2009] On page 388, in the solution to exercise 17.10, on the first line, replace eqrefeq:BSE with (17.2).

[12/20/2009] On page 391, in the solution to exercise 17.23, on the second line, change (17.7) to (17.10).

[8/30/2009] On page 395, the solution to exercise 17.36 is incorrect. The correct solution is

This is an Ornstein-Uhlenbeck process of the form

$$dX(t) = 0.5(0.05 - X(t))dt + 0.2dZ(t)$$

If we let  $Y(t) = X(t)^2$ , then the derivatives are  $Y_X = 2X$ ,  $Y_{XX} = 2$ ,  $Y_t = 0$ . By Itô's lemma,

$$\begin{aligned} dY(t) &= 2X(t)dX(t) + 0.5(2)(dX(t))^2 \\ &= 2X(t)(0.5)(0.05 - X(t))dt + 2X(t)(0.2)dZ(t) + 0.2^2 dt \\ &= \left( X(t)(0.05 - X(t)) + 0.04 \right) dt + 0.4X(t)dZ(t) \end{aligned}$$

[9/2/2009] On page 402, last 3 lines of page, the definition of  $\sigma_t$  is inconsistent with McDonald. Replace these three lines with

This ratio is equal to  $e^{2\sigma_i\sqrt{h}}$  in column  $i$ , where  $h$  is the amount of time since the start.  $\sigma_i$  is the annualized lognormal yield volatility of time  $i$  yields, which is not the same as the volatilities in Table 18.1 which are volatilities of  $n - 1$ -year yields in year 1, unless the period is one year and  $n - 1 = 1$ , in which case the volatility of 1-year yields at year 1 is  $\sigma_1$ .

[12/28/2009] On page 404, in Quiz 18-4, to make the question clearer, change the phrase “3-year...” to “4-year zero-coupon bonds issued at year 0”.

- [3/29/2010] On page 411, in exercise 18.10, the tree is not a Black-Derman-Toy tree.
- [3/29/2010] On page 415, in the solution to exercise 18.8, change  $\sigma$  to  $\sigma_1$  in the first two displayed lines.
- [10/4/2009] On page 423, on the fourth displayed line, insert “=” between  $N(-0.01)$  and 0.4960.
- [8/18/2009] On page 424, replace the first displayed line of Table 19.1 with

$$C(F, P(0, T), \sigma, T) = P(0, T)(FN(d_1) - KN(d_2))$$

- [2/25/2010] On page 429, three lines above Example 20A, the sign of  $N$  is incorrect. Replace the phrase starting with is  $-N$  through the parenthetical sentence with  
is  $N = -t_1P(0, t_1)/t_2P(0, t_2)$ . (In other words,  $N$  is the number of bonds to buy; it is negative, so you should sell bonds.)
- [4/29/2010] On page 429, the last two lines of the table in the answer to Example 20A should be

Loan	$0.904838e^{0.05/365} = 0.904962$	0.904962
Total	0.000218	0.000214

- [12/30/2009] On page 431, on the first line of the fourth paragraph, add “to” between “leads” and “an”.
- [5/5/2010] On page 431, one line below equation (20.7), put “d”’s before the two  $Z$ ’s:  
Here,  $d\tilde{Z}(t) = dZ(t) - \phi(r, t)$ .
- [12/30/2009] On page 432, on the line after the 4th displayed equation, a slash is missing:  $P_r(t, t, T) = -q(r, t, T)P(r, t, T)/\sigma(r)$ .
- [12/25/2009] On page 437, on the third line of Quiz 20-3, the interest rate risk premium is  $-0.05$  (not 0.05). In general, the interest rate process has a negative risk premium.
- [10/15/2009] On page 438, on the third displayed line, replace  $\sigma^2$  with  $\bar{\sigma}^2 r$ .
- [4/6/2010] On page 444, on the second line, change  $e^{0.1(4)}$  to  $e^{-0.1(4)}$ .
- [8/30/2009] On page 445, Example 20L requires knowledge of the formula for an infinitely-lived bond under Vasicek. Note that one of the SOA sample questions require knowledge of the formula for an infinitely-lived bond under CIR.
- [9/30/2009] On page 452, the information for exercises 20.23–20.24 should also be used for exercise 20.25.
- [10/5/2009] On page 455, in the solution to exercise 20.10, on the second displayed line, put a – before  $5y$ .
- [10/5/2009] On page 458, in the solution to exercise 20.22, on the fourth displayed line, replace  $P(0.06, 0, 10)$  in the denominator with  $P(0.06, 0, 2)$ .
- [8/22/2009] On page 468, in question 11, change 9.9724 to 10.6024.
- [3/31/2010] On page 470, in question 21, replace choices (C), (D), and (E) with 0.68, 0.70, 0.72 respectively.
- [3/31/2010] On page 474, on the first line of question 6, change “write” to “writes”.
- [10/9/2009] On page 474, in question 7(iv), change “stock” to “exchange rate”.
- [8/23/2009] On page 477, in question 19, on the first line, change “weekly” to “monthly”.
- [10/11/2009] On page 482, in question 7(ii), change  $dZ$  to  $d\tilde{Z}$ .
- [10/11/2009] On page 486, in question 18, delete the denominator  $C(t)$  and one of the  $d$ ’s before  $Z(t)$ , so that the displayed line is

$$dC(t) = aC(t)dt + bC(t)dZ(t)$$

[10/31/2009] On page 492, question 14 is defective and should be deleted.

[10/31/2009] On page 501, in question 17(iii), 0.04 should be  $0.04t$ .

[4/14/2010] On page 516, in question 11, add after (vi):

(vii) The strike prices of the compound options are all the same.

[4/14/2010] On page 519, in question 22, add at the end of the first sentence “based on forward prices”.

[5/7/2010] On page 522, in question 4(i), add “ $dt$ ” after  $0.4(0.06 - r(t))$ .

[10/25/2009] On page 530, in question 4, the last word in the question should be “expiry”.

[4/20/2010] On page 534, in question 17, add at the end of (iii): “Dividends are not incorporated in the index.”

[10/26/2009] On page 535, in question 23, replace the first two sentences with

There are two possible states for the price of a stock after one year.

[11/1/2009] On page 539, in question 7, change “futures” to “forward” in the three places the word appears. This question assumes that there are no mark-to-market adjustments on the contract. The forward contract is only settled at its expiry.

[8/22/2009] On page 560, in the solution to question 11, on the second displayed line, change 9.9724 to 10.6024.

[3/31/2010] On page 563, in the solution to question 24, on the second line, change the  $t$  in the first exponent to  $h$ .

[5/5/2010] On page 574, in the solution to question 9, on the first line, put “ln” before  $X(5)/X(0)$ .

[9/9/2009] On page 575, in the solution to question 11, replace the 5 displayed lines with

$$\begin{aligned} P(0,2) &= e^{-0.1} (0.6e^{-0.3} + 0.4e^{-0.05}) = 0.746475 \\ P_u(1,3) &= e^{-0.3} (0.6e^{-0.5} + 0.4e^{-0.1}) = 0.537725 \\ P_d(1,3) &= e^{-0.05} (0.6e^{-0.1} + 0.4e^{-0.02}) = 0.889382 \\ P(0,3) &= e^{-0.1} (0.6(0.537725) + 0.4(0.889382)) = 0.613831 \\ F_{0,2}(P(2,3)) &= \frac{0.613831}{0.746475} = \boxed{0.8223} \end{aligned}$$

[10/12/2009] On page 577, in the solution to question 18, on the first displayed line, change  $0.2 dZ$  to  $0.2S dZ$ .

[10/11/2009] On page 582, in the solution to question 6, on the first displayed line, replace the denominator  $dt$  with  $S(t)$ .

[5/8/2010] On page 584, in the solution to question 10, on the third line from the end, change the exponent  $rt_1$  to  $-rt_1$ .

[10/17/2009] On page 587, in the solution to question 21, on the third displayed line, put a minus sign in front of 0.91762.

[10/31/2009] On page 588, in the solution to question 24, on the second line below the table, change  $e^{-0.04/12}$  to  $e^{-0.04/4}$ . On the third line below the table, change 48.16 to 48.17.

[10/15/2009] On page 592, replace the first three words of the solution to question 11 with “The factors for”.

[11/1/2009] On page 594, in the solution to question 16, on the last line of the table and the line after the table replace 5.0928 with 5.0918 (once a piece).

[10/15/2009] On page 594, in the solution to question 17, on the first displayed line, delete “1” from the numerator.

[10/17/2009] On page 598, in the solution to question 2, on the second line, change the first  $N(-\hat{d}_1)$  to  $S_0 e^{(\alpha-\delta)t} N(-\hat{d}_1)$ .

[4/28/2010] On page 599, in the solution to question 4, replace the right side of the third displayed equation  $(0.06\sigma\sqrt{t})$  with  $(\ln S - \ln 55 + (r - \delta + 0.5\sigma^2)t) - (\ln 61 - \ln 55)$ .

[10/17/2009] On page 601, in the solution to question 10, change the answer key from (A) to (B). Also correct the answer key on page 598.

[10/17/2009] On page 603, in the solution to question 15, on the fourth displayed line, change the exponent on  $e$  from  $(r - \delta)$  to  $(r - \delta)h$ .

[10/17/2009] On page 604, in the solution to question 19, replace the second and third sentences with

The fact that the futures contract is for 2 years is extraneous, as is the dividend rate.

The last line should read

$$C(200, 180, 1) = e^{-0.05} (200(0.6772) - 180(0.5239)) = \boxed{39.13} \quad (\text{C})$$

[10/14/2009] On page 609, replace the last paragraph of the solution to question 6 with the following: The profit Susan Hedger makes has the following components:

1. The original cost of buying the call option and selling the stock short is  $7.40 - 0.56(50) = -20.60$ , so Susan lent 20.60 at the risk-free rate. She receives  $20.60(1.076923) = 22.18$  as proceeds from this loan.
2. When closing the position, selling the call option results in proceeds of **4.34**.
3. To buy the shorted stock back, Susan must pay both the value of the stocks and the value of the dividends. Since the dividends accumulate continuously at the risk-free rate, the payment made is  $0.56(50)(1.076923) = 30.15$  resulting in proceeds of **-30.15**.

The total profit is  $22.18 + 4.34 - 30.15 = \boxed{-3.63}$ . (A)

The answer key for question 6 on page 607 should be changed from D to A.

[11/1/2009] On page 613, in the solution to question 21, on the third displayed line, change  $e^{-rs}$  to  $e^{-3rs}$ .

[10/20/2009] On page 617, in the solution to question 4, on the first line, change  $a = 0.06$  to  $a = 0.4$ .

[10/20/2009] On page 624, in the solution to question 25, on the first line, change  $F_{0,1}[P(0,2)]$  to  $F_{0,1}[P(1,2)]$ .

[9/17/2009] On page 626, in the answer key, change the answer to question 13 from B to D.

[5/10/2010] On page 629, in the solution to question 9, on the last line, change the denominator  $u - d$  to  $F_{uu} - F_{ud}$ .

[5/2/2010] On page 631, in the solution to question 13, on the first 4 lines, change  $e^{0.04t}$  to  $e^{0.0375t}$  once on each line. Also change the coefficients 0.04 on the last line of page 631 and the 3rd line of page 632 to 0.0375.

[10/20/2009] On page 643, the solution to question 16 is incorrect. The correct solution is:

The exchange rate for euros in dollars is the inverse of the dollar-in-euro rate. You can use the formula for the Itô process for  $S^{-1}(a)$ , or derive the Itô process directly:

$$\begin{aligned} d\ln X(t) &= (0.02 - 0.5(0.4^2))dt + 0.40dZ(t) = -0.06dt + 0.40dZ(t) \\ -d\ln X(t) &= 0.06dt - 0.40dZ(t) \end{aligned}$$

$$\frac{dX^{-1}(t)}{X^{-1}(t)} = (0.06 + 0.5(0.40^2))dt - 0.40 dZ(t) = 0.14 dt - 0.40 dZ(t)$$

The negative sign on the volatility has no effect on the use of the Black-Scholes formula, since  $-Z(t)$  is a Brownian motion just like  $Z(t)$  is.

The expected payoff, as discussed in Section 7.3, is  $x_0 e^{\alpha - \delta} N(\hat{d}_1) - KN(\hat{d}_2)$ .

$$\begin{aligned} \hat{d}_1 &= \frac{0.14 + 0.5(0.4^2)}{0.4} = 0.55 & N(\hat{d}_1) &= 0.7088 \\ \hat{d}_2 &= 0.55 - 0.4 = 0.15 & N(\hat{d}_2) &= 0.5596 \end{aligned}$$

$$E[\text{Payoff}] = 1.25e^{0.14}(0.7088) - 1.25(0.5596) = \boxed{0.32}$$

- [7/26/2010] On page 645, in the solution to question 24, on the second displayed line, change  $-e^{-3r_f}$  to  $+e^{-3r_f}$ .
- [10/27/2009] On page 649, in the solution to question 9, on the second line, change  $\ln Q(1)$  to  $Q(1)$ .
- [10/17/2009] On page 650, in the solution to question 12, on the first displayed line,  $F_{0,1}(Q)$  should be  $F_{0,1}^P(Q)$ .
- [2/12/2010] On page 668, in the solution to question 25, on the second line, change  $e^{-0.05}$  to  $e^{-0.05/4}$ .
- [2/12/2010] On page 669, in the solution to question 28, on the second displayed line, change 6.98 to 8.74.
- [5/22/2009] On page 671, delete the paragraph before the solution to question 1, beginning with "If you wish to work out these questions".
- [10/19/2009] On page 679, in the solution to question 26, on the second line, change  $Se^{\delta t}$  to  $Se^{-\delta t}$ .
- [7/20/2009] On page 681, in the solution to question 31, replace the last equation with  $0.5374 - 0.5219 = \boxed{0.0155}$ .
- [4/29/2010] On page 682, in the solution to question 32, on the last displayed line, the right-hand side is missing a  $t$  and the last minus should be plus:  $(1 - \varphi)(r + 0.5\varphi\sigma^2)t$ .
- [10/2/2009] On page 683, in the solution to question 36, on the third displayed line, move  $\partial C / \partial t = 0$  to a separate line.
- [9/17/2009] On page 684, in the solution to question 38, on the last displayed line, change  $-0.02(2)$  to  $+0.02(2)$ .
- [9/17/2009] On page 684, in the solution to question 39, on the third line, replace  $S - F^P(108)$  with  $F^P(108) - S$ .

[10/31/2009] On page 690, here's an updated Table C.2 including the sample questions added in August 2009:

Sample Questions						MFE-S07		CAS3-S07		CAS3-F07		MFE/3F-S09	
Q	Lesson	Q	Lesson	Q	Lesson	Q	Lesson	Q	Lesson	Q	Lesson	Q	Lesson
1	1	26	2	51	8	1	1	3	1	13	2	1	4
2	2	27	3	52	15	2	5	4	1	14	1	2	13
3	13	28	14	53	14	3	9	12	2	15	1	3	3
4	4	29	18	54	14	4	6	13	1	16	1	4	14
5	4	30	18	55	9	5	10	14	4	17	3	5	18
6	9	31	10	56	13	6	14	15	3	18	4	6	17
7	9	32	17	57	??	7	19	16	3	19	3	7	5
8	10	33	14	58	??	8	9	17	4	20	9	8	17
9	12	34	17	59	??	9	18	20	9	21	9	9	1
10	16	35	17	60	20	10	12	21	9	22	10	10	17
11	16	36	17			11	4	32	12	23	3	11	17
12	17	37	13			12	17	33	12	24	12	12	2
13	17	38	20			13	20	34	13	25	1	13	9
14	20	39	3			14	3	35	17	26	14	14	18
15	18	40	11			15	9	36	20	27	13	15	20
16	17	41	14			17	14	37	18	28	13	16	16
17	6	42	13			18	17			29	10	17	10
18	14	43	17			19	12					18	17
19	14	44	4									19	9
20	10	45	12									20	12
21	20	46	4										
22	20	47	12										
23	16	48	17										
24	17	49	3										
25	14	50	7										

For all exams, only the questions listed above are on the current MFE/3F syllabus