MSG800/MVE170 and MVE172

List of Errata for Hsu's book, Version 14 November 2020

Equation 2.41. $F_X(X)$ should be $F_X(x)$.

Equation 2.53. Just after (2.53) it should be $\lfloor x \rfloor$ instead of $|x|$. In 3'rd and 4'th Ed of printed book this needs correction but is corrected in e-version of 4'th Ed.

Equation 3.14. It should be $\lim_{x\to\infty}$ instead of $\lim_{y\to\infty}$.

Exercise 3.12. $P(Y=1|X=1)$ should be $P(Y=0|X=1)$ on diagonal in figure.

Problem 4.100. X'' should be corrected to X^n.

Section 5.4 B. The definition of WSS should be the conditions (5.21)-(5.22): "Stationary of order 2" is a much stronger condition.

Equation 5.28 is wrong as is the proof of (another version of) that formula in Problem 5.25: The second equality in the three line equation at the middle of the solution is erroneous. To see this we may send $x_{n-1}\to\infty$ on both sides of the equation to obtain

$$F_X(x_1,\ldots,x_{n-2},x_n;t_1,\ldots,t_{n-2},t_n) = F_X(x_n;t_n)\times F_X(x_1,\ldots,x_{n-2};t_1,\ldots,t_{n-2}),$$

which is to say that $X(t_n)$ is independent of $X(t_1),...,X(t_{n-2})$. This is absurd as this need not hold at all for a Markov process (as is e.g., exemplified by a Poisson process).

A correct version of Equation 5.28 is the formula for PMF's given in Problem 5.88.

Equation 5.29. It should be $E[X(t_i)]$ instead of just $E[X(t_i)$.

Equation 5.51. It is in Problem 5.94 that (5.51) is proved - not in Problem 5.74.

Lemma 5.8.1. It should be T_1 and T_2 instead of n_1 and n_2, respectively.

Optional stopping theorem is wrongly called optimal stopping theorem in 3'rd printed Ed of book.

Equation 5.121. It should be $\cos\omega\tau$ instead of $\cos\omega t$ in the middle row.

Problem 5.37. It should be $\gcd\{2,4,6,\ldots\}$ instead of $\gcd\{2,5,6,\ldots\}$.

Problem 5.49. Four occurances of $X(t+\Delta t)-X(0)$ should be $X(t+\Delta t)-X(t)$.

Equation 5.202. It should be σ's instead of a's in the $\mathbf{K_X}$-matrix.

Problem 5.70. The alternative possible value of X_i should be -1 with probablity $q=1-p$. In 3'rd Ed of printed book this needs correction but is corrected in both printed and e-version of 4'th Ed. And such a random variable is not called Bernoulli distributed.

Problem 5.72. Here $\frac{n(n-1)}{2}$ should be $n(n-1)$ and $\frac{n(n+3)}{2}$ should be $n(n+1)$.

Problem 5.74. Here $\frac{n+2+k}{n+2}$ should be $\frac{n+2-k}{n+2}$.

Problem 5.76. Change $E(|g(Xn|)$ to $E(|g(X_n)|)$.

Problem 5.77. A correct proof that $\mathbf{E}\{|X_n|\}<\infty$ is as follows:

$$\mathbf{E}\{|X_n|\} = \mathbf{E}\big\{|\mathbf{E}\{X\,|\,F_n\}|\big\} \le \mathbf{E}\big\{\mathbf{E}\{|X|\,|\,F_n\}\big\} = \mathbf{E}\{|X|\} < \infty.$$

The initial condition should be $\mathbf{E}\{|X|\} < \infty$ instead of $\mathbf{E}\{X\} < \infty$ accordingly.

Problem 5.78. In 3'rd and 4'th Ed of printed book Theorem 5.82 should be Theorem 5.8.2 at two occurances but this is corrected in e-version of 4'th Ed.

Problem 5.79. One occurance of $\{T > k-1$ should be $\{T > k-1\}$.

Problem 5.81. At beginning of solution of problem a one occurence of s_n should be S_n and close to end of solution of problem b the first $\frac{a}{a+b}$ should be $\frac{b}{a+b}$.

Problem 5.82. It should be $X(t)-\lambda\,t$ instead of $x(t)-\lambda\,t$ at two places.

Problem 6.8 b. At the beginning of the solution of problem b it should be $\partial^2 R_X(s-t)/\partial t\partial s = -d^2 R_X(\tau)/d\tau^2$, i.e., a $-$ is missing.

Problem 6.12. In the solution of problem b one occurence of $E[X(s)]X(\beta)]$ should be $E[X(s)X(\beta)]$ and in the equation before (6.124) the s^3 on the right hand side should be s^2.

Equation 6.137. It should be $R_{X'}(t,s)$ instead of $R_X(t,s)$.

Problem 6.26. In the right most expression for $S_Y(\omega)$ factor $\frac{a}{(a^2+b^2)b}$ should be $\frac{a}{(a^2-b^2)b}$.

Equation 9.20. In the sum it should be $(s\rho)^n$ instead of just $(s\rho)$.

Equation 9.22. Change $(sp)^s$ to $(s\rho)^s$.

Equation 9.36. Change ρ_0 to p_0.

Equation 9.39. On the right-hand side L_q should be divided by $\lambda_e = \lambda\,(1-p_K)$.

Problem 9.13. Beginning of solution to problem a reference to (9.16) should be to (9.17). In the final evaluation of W_q the term $-1/\mu = -3$ which should be there according to (9.54) has been forgotten in the middle term (but the answer to the right 6.39 min is correct).

Problem 9.16. The "balance equation" (9.2) $L = \lambda\,W$ holds for all steady-state queues provided that we set the total time spent in the system to zero for customers arriving when the system is full for queues with $K < \infty$, i.e., if we interpret the fact that customers arriving to a full system bounces away as that they spend zero time in system.

If we instead (as is custom and as is done in the book) define W as the expected total time spent in the system for customers that really join the system, then we must divide the W from the previous paragraph by $1-p_K$ to get this W. And then we have (9.31) $L = \lambda\,(1-p_K)\,W$ for this alternative (and customary/correct) definition of W.

The sum in the second last equation of the solution should only run to $K-1$, giving $W_q = (L - K\,p_K)/\mu$. The sum in the last equation of the solution should also only run to $K-1$ giving $W = (L+1-(K+1)\,p_K)/\mu$. Now, here we are dealing with the first definition of W from above, i.e., we assign zero time in the system for bouncing customers and let that zero influence the mean value W, so that $L = \lambda\,W$ for this W.

As we want the customary/correct definition of W to be the expected total time spent in the system for customers that really joins the system we have to divide the W obtained in the previous paragraph by $1 - p_K$ giving the following correct version (9.59): $W = (L+1-(K+1)\,p_K)/(\mu\,(1-p_K))$. The corresponding correct version of (9.58) is $W_q = (L+1-(K+1)\,p_K)/(\mu\,(1-p_K)) - 1/\mu = (L - K\,p_K)/(\mu\,(1-p_K))$.

Problem 9.18. In the middle of the calculation p^m should be changed to ρ^m.

Problem 9.29. To solve problem a Hsu has used faulty (9.59) - see above - to obtain $W = (L+1)/\mu = \ldots = 0.336$ hours $= 20.15$ minutes, while a correct answer comes from using the correct version of that formula from above $W = (L+1-(K+1)\,p_K)/(\mu\,(1-p_K)) = (L-K\,p_K)/(\mu\,(1-p_K)) + 1/\mu = 7/57 + 1/6 = 0.289$ hours $= 17.4$ minutes, or from using (9.31). The correct answer to problem b is $W_q = W - 1/\mu = W - 10$ minutes $= 7.4$ minutes.

Problem 9.30. The correct answer is 1.

Table B-2. In Formula 11 the right hand side should be $X(\omega) = (\pi/a)\,\mathrm{e}^{-a|w|}$.