MSG800/MVE170 Basic Stochastic Processes Fall 2013

List of Errata for Hsu's book, Version 2 November 2013

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

Figure 3.4. It should be $P(Y=0\,|\,X=1)$ instead of $P(Y=1\,|\,X=1)$ on the diagonal.

Problem 4.100 in the Second Edition (Problem 4.80 in the first). X'' should be X^n.

Equation 5.28 is wrong as is the proof of (another version of) that formula in Problem 5.25: It is the second equality in the three line equation in the middle of the problem text that is erroneous. To see this we 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.

Equations 5.21-5.22. The correct definition of wide-sense stationarity is that the two conditions (5.21) and (5.22) hold.

On the line before Equation 5.51. (Prob. 5.74) should be (Prob. 5.94).

Lemma 5.8.1 in the Second Edition. T_1 and T_2 instead of n_1 and n_2, respectively.

Equation 5.121 in the Second Edition. $\cos\omega\tau$ instead of $\cos\omega t$ on 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 in the Second Edition. It should be σ's instead of a's in $\mathbf{K_X}$.

Problem 5.70 in the Second Edition. The alternative possible value of X_i should not be 0 but -1 with probablity $q=1-p$. Such a random variable is not Bernoulli distributed.

Problem 5.72 in the Second Edition. On row 11 $\frac{n(n-1)}{2}$ should be $n(n-1)$ and $\frac{n(n+3)}{2}$ should be $n(n+1)$.

Problem 5.74 in the Second Edition. On row 7 it should be $\frac{n+2-k}{n+2}$ instead of $\frac{n+2+k}{n+2}$.

Problem 5.77 in the Second Edition. On row 4 of the problem it should be

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

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

Problem 5.78 in the Second Edition. Theorem 5.82 should be Theorem 5.8.2.

Page 266 in the Second Edition. On row 11 s_n should be S_n and on row -4 the first $\frac{a}{a+b}$ should be $\frac{b}{a+b}$.

Problem 5.82 in the Second Edition. It should be $X(t)-\lambda t$ instead of $x(t)-\lambda t$.

Problem 6.8 b in the Second Edition. On the first row of the solution it should be $\partial^2 R_X(s-t)/\partial t\partial s=-d^2R_X(\tau)/d\tau^2$.

Page 288 in the Second Edition. On row 8 it should be $E[X(s)X(\beta)]$ and on row 12 the second s^3 should be s^2.

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

Page 295 in the Second Edition. On the last line $\frac{a}{(a^2+b^2)b}$ should be $\frac{a}{(a^2-b^2)b}$.

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

Equations 9.22 in the Second Edition. Correct sp to $s\rho$.

Equations 9.36. Correct 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. In the solution to Task a (9.16) should be (9.17). In the final evaluation of W_q Hsu has forgotten to subtract $-1/\mu = -3$, but the result 6.39 min is still right.

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 Equation 9.31 $L = \lambda\,(1-p_K)\,W$ for this alternative (and customary) definition of W.

In the solution to Problem 9.16 the sum in the second equation from the end should only run to $K-1$, giving $W_q = (L-K\,p_K)/\mu$. The sum in the last equation 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 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 of Equation 9.59: $W = (L+1-(K+1)\,p_K)/(\mu\,(1-p_K))$. The corresponding correct version of Equation 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 Second Edition. On row 3 from the bottom p^m should be ρ^m.

Problem 9.29. In Task a Hsu has used the faulty Equation 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 Equation 9.31). The answer to Task 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 $X(\omega) = (\pi/a)\,\mathrm{e}^{-a|w|}$.