Errata & Changes: Lecture Notes on on Probability and Random Processes

for

sf2940 Probability Theory Edition 2014

THESE CORRECTIONS/ADDITIONS AND CHANGES HAVE BEEN MADE ON THE THE COURSE HOMEPAGE FILE

- p. 16 It follows that $\mathcal{A}$ is an algebra and that $\mathcal{C} \in \mathcal{A}$. Furthermore, ...

  SHOULD BE

  It follows that $\mathcal{A}$ is an algebra and that $\mathcal{C} \subseteq \mathcal{A}$. Furthermore,

  $\mathcal{A} \in \mathcal{B}$ for any algebra $\mathcal{B}$ containing $\mathcal{C}$

  SHOULD BE

  $\mathcal{A} \subseteq \mathcal{B}$ for any algebra $\mathcal{B}$ containing $\mathcal{C}$

- p. 24 hence the interval $[1, 2]$ would have infinite length. should read $\rightarrow$ hence the interval $[-1, 2]$ would have infinite length.

- p. 82 Exercise 10. Find the marginal p.d.f.'s $f_X(x)$ and $f_Y(y)$. *Answer:*

$$f_X(x) = \begin{cases} 0 & x \leq 0 \\ \frac{x+c}{1+c} e^{-x} & x \leq 0. \end{cases}$$

  Find the marginal p.d.f.'s $f_X(x)$ and $f_Y(y)$. *Answer:*

$$f_X(x) = \begin{cases} 0 & x \leq 0 \\ \frac{x+c}{1+c} e^{-x} & x \geq 0. \end{cases}$$

- p. 106 Given $\mathbf{P}(A) = a$ and $\mathbf{P}(B) = b$, show that $\frac{a+b-1}{b} \leq \mathbf{P}(A \mid B) \geq \frac{a}{b}$.

  SHOULD BE

  Given $\mathbf{P}(A) = a$ and $\mathbf{P}(B) = b$, show that $\frac{a+b-1}{b} \leq \mathbf{P}(A \mid B) \leq \frac{a}{b}$.

- p. 136 Exercise 3

$$\frac{X+Y}{2} \stackrel{d}{=} \max(X, Y).$$

  SHOULD BE

$$X + \frac{Y}{2} \stackrel{d}{=} \max(X, Y).$$

- p. 142 Example 5.1.2.

$$g_X(t) = \sum_{k=0}^{\infty} t^k e^{-\lambda} \frac{k^\lambda}{k!} =$$

SHOULD BE

$$g_X(t) = \sum_{k=0}^{\infty} t^k e^{-\lambda} \frac{\lambda^k}{k!} =$$

- p. 185 Exercise 7. $\{X_n\}_{n\geq 1}$ is a sequence of I.I.D. r.v.'s with $E[X_n] = 1$ and

  SHOULD BE:

  $\{X_n\}_{n\geq 1}$ is a sequence of non negative I.I.D. r.v.'s with $E[X_n] = 1$ and

- p. 187 exercise 3. It reads:

  Define

$$X_n = \begin{cases} 1 & \text{with probability } n^{-1} \\ 0 & \text{with probability } 1 - n^{-1} \end{cases}$$

  Correction:

  Define a sequence of independent r.v.'s

$$X_n = \begin{cases} 1 & \text{with probability } n^{-1} \\ 0 & \text{with probability } 1 - n^{-1} \end{cases}$$

- p.188 exercise 4 Show that

$$\sum_{k=1}^{n} a_k \stackrel{\text{a.s}}{\rightarrow} \frac{1}{2},$$

  as $n \to \infty$.

  Corrected:

$$\frac{1}{n}\sum_{k=1}^{n} a_k \stackrel{\text{a.s}}{\rightarrow} \frac{1}{2},$$

  as $n \to \infty$.

- p. 217 exercise 15 *Answer:* $N(6.5, \frac{25}{2})$.

  CORRECTED:

  Answer: $N(6, 2)$.

- p. 226

$$\phi_{\mathbf{X}}(\mathbf{s}) = E\left[e^{i\left(A\sin(\phi)\sum_{i=1}^{n} s_k \cos(wt_k)\right)}\right] \cdot E\left[e^{i\left(A\cos(\phi)\sum_{i=1}^{n} s_k \sin(wt_k)\right)}\right]$$

$$= E\left[e^{-i\frac{\sigma^2}{2}\sum_{j=1}^{k}\sum_{i=1}^{n} s_i s_k \cos(w(t_k - t_j))}\right].$$

CORRECTED

$$\phi_{\mathbf{X}}(\mathbf{s}) = E\left[e^{i\left(A\sin(\phi)\sum_{k=1}^{n} s_k \cos(wt_k)\right)}\right] \cdot E\left[e^{i\left(A\cos(\phi)\sum_{k=1}^{n} s_k \sin(wt_k)\right)}\right]$$

$$= E\left[e^{-i\frac{\sigma^2}{2}\sum_{j=1}^{n}\sum_{k=1}^{n} s_j s_k \cos(w(t_k - t_j))}\right].$$

- p. 245 eq. (9.35)

$$f_{X(t)|X(t_0)=x}(y) = \int_{-\infty}^{\infty} f_{X(t)|X(s)=u}(v) \cdot f_{X(s)|X(t_0)=x}(u)\, du. \qquad (0.1)$$

CORRECTED

$$f_{X(t)|X(t_0)=x}(y) = \int_{-\infty}^{\infty} f_{X(t)|X(s)=u}(y) \cdot f_{X(s)|X(t_0)=x}(u)\, du. \qquad (0.2)$$

- p. 292 Show that $W_H(t) \stackrel{d}{=} \frac{1}{a^H} W_H(t)(at)$, where $a > 0$.

SHOULD BE

Show that $W_H(t) \stackrel{d}{=} \frac{1}{a^H} W_H(at)$, where $a > 0$.

- p. 307

$$\frac{\partial}{\partial s}\mathrm{Cov}_{\mathbf{U}}(t,s) = a\mathrm{Cov}_{\mathbf{U}}(t,s), \quad s > t.$$

SHOULD BE

$$\frac{\partial}{\partial s}\mathrm{Cov}_{\mathbf{U}}(t,s) = -a\mathrm{Cov}_{\mathbf{U}}(t,s), \quad s > t.$$

- p. 316

$$= \int_0^{\infty} e^{-\lambda}\frac{\lambda^l}{l!} f_{T_k}(u)du = e^{-\lambda}\frac{\lambda^l}{l!}\underbrace{\int_0^{\infty} f_{T_k}(u)du}_{=1} = e^{-\lambda}\frac{\lambda^l}{l!},$$

as

SHOULD BE

$$= \int_0^{\infty} e^{-\lambda(t-s)}\frac{(\lambda(t-s))^l}{l!} f_{T_k}(u)du = e^{-\lambda(t-s)}\frac{(\lambda(t-s))^l}{l!}\underbrace{\int_0^{\infty} f_{T_k}(u)du}_{=1} = e^{-\lambda(t-s)}\frac{(\lambda(t-s))^l}{l!},$$

p. 318

$$= \sum_{l=0}^{\infty} e^{-\lambda t} \frac{\left(\lambda^l \int_0^t e^{sh(t-x)} dx\right)^l}{l!}$$

should be

$$= \sum_{l=0}^{\infty} e^{-\lambda t} \frac{\left(\lambda \int_0^t e^{sh(t-x)} dx\right)^l}{l!}$$