Subject CS1

Corrections to 2020 study material

0 Comment

This document contains details of any errors and ambiguities in the Subject CS1 study materials for the 2020 exams that have been brought to our attention. We will incorporate these changes in the study material each year. We are always happy to receive feedback from students, particularly details concerning any errors, contradictions or unclear statements in the courses. If you have any such comments on this course please email them to CS1@bpp.com.

This document was last updated on **8 September 2020**.

1 Paper A Course Notes

Chapter 2

Corrections added on 8 September 2020

Page 62

In Question 2.13 part (a), the ranges given for relating r to the simulated value do not have the correct inequalities. They should be:

$$n = \begin{cases} 0 & \text{if } 0 \le r \le 0.55 \\ 1 & \text{if } 0.55 < r \le 0.8 \\ 2 & \text{if } 0.8 < r \le 0.95 \\ 3 & \text{if } 0.95 < r \le 1 \end{cases}$$

Page 62

In Question 2.13 part (b), the inequalities in the solution are incorrect. The answer to part (b) should read:

Since $0.55 < 0.6221 \le 0.8$, the first simulated value is 1. Since $0 < 0.1472 \le 0.55$, the second simulated value is 0. Since $0.95 < 0.9862 \le 1$, the third simulated value is 3.

Chapter 4

Corrections added on 8 September 2020

Page 11

At the bottom of the page, the final part to the question should be part (iii) not part (ii).

Page 12

In the solution to part (iii) on this page, the range given for x and y is incorrect. It should be:

$$0 < y < x < 2$$

Page 50

The last line of part (ii) should read:

Determine $E(U | V = v)$ for the interval $0.5 < v < 2$.

Page 60

The solution should read:

We require:

$$E(U\,|\,V=v)=\int_u u\,f(u\,|\,v)\,du$$

Now, for the case when $0.5<v<2$:

$$f(v)=\int_{u=0}^{1}\tfrac{48}{67}(2uv-u^2)\,du=\tfrac{48}{67}\left[u^2v-\tfrac{1}{3}u^3\right]_{u=0}^{1}=\tfrac{48}{67}\left[v-\tfrac{1}{3}\right] \qquad [1]$$

$$\Rightarrow \quad f(u\,|\,v)=\frac{f(u,v)}{f(v)}=\frac{\tfrac{48}{67}(2uv-u^2)}{\tfrac{48}{67}(v-\tfrac{1}{3})}=\frac{2uv-u^2}{v-\tfrac{1}{3}} \quad \text{for } 0<u<1,\ 0.5<v<2 \qquad [1]$$

If $v\le 0.5$ *then, as we require* $\tfrac{u}{2}<v\Leftrightarrow u<2v$, *the correct range to integrate over is from 0 to* $2v$ *instead of from 0 to 1. The full marginal probability density function for* v *is given by:*

$$f(v)=\begin{cases}\tfrac{64}{67}v^3 & \text{for } 0<v\le 0.5\\ \tfrac{48}{67}\left[v-\tfrac{1}{3}\right] & \text{for } 0.5<v<2\end{cases}$$

So:

$$E(U\,|\,V=v)=\int_{u=0}^{1}\frac{2u^2v-u^3}{v-\tfrac{1}{3}}\,du=\left[\frac{\tfrac{2}{3}u^3v-\tfrac{1}{4}u^4}{v-\tfrac{1}{3}}\right]_{u=0}^{1}=\frac{\tfrac{2}{3}v-\tfrac{1}{4}}{v-\tfrac{1}{3}} \quad \text{for } 0.5<v<2 \qquad [1]$$

Again, if $v\le 0.5$, *then the correct range to integrate over is from 0 to* $2v$ *instead of from 0 to 1. The conditional expectation for all values of* v is given by:

$$E(U\,|\,V=v)=\begin{cases}v & \text{for } 0<v\le 0.5\\ \dfrac{\tfrac{2}{3}v-\tfrac{1}{4}}{v-\tfrac{1}{3}} & \text{for } 0.5<v<2\end{cases}$$

Chapter 5

Correction added on 8 September 2020

Page 5

The conditional expectation in the solution is incorrect as the limits on the integral are wrong. The solution should be:

$$E(Y \mid X=x)=\int_0^x y\,\frac{2}{3}\left(\frac{1}{x}+\frac{y}{x^2}\right)dy$$

$$=\int_0^x \frac{2y}{3x}+\frac{2y^2}{3x^2}\,dy=\left[\frac{y^2}{3x}+\frac{2y^3}{9x^2}\right]_0^x=\frac{x^2}{3x}+\frac{2x^3}{9x^2}=\frac{5}{9}x \qquad 0<x<2$$

Chapter 7

Correction added on 19 December 2019

Page 29

In the solution to Question 7.5(ii), the first indented equation line should read:

$$\frac{U/m}{V/n} \sim F_{m,n}$$

2 Revision Notes

Booklet 3

Correction added on 8 September 2020

Page 67

In the solution to Question 6, the letter used to represent the sum of the X_i's should be S rather than X. The mean and variance of the approximate normal distribution (200 and 300) are also the wrong way around in the standardisations (although the resulting numbers are correct). After the approximate distribution for S is given, the solution should be:

Using a continuity correction, the probability is:

$$P(280 \leq S \leq 320) \to P(279.5 < S < 320.5)$$

Standardising this:

$$\begin{aligned} P(279.5 < S < 320.5) &= P(S < 320.5) - P(S < 279.5) \\ &\approx P\left(Z < \frac{320.5-300}{\sqrt{200}}\right) - P\left(Z < \frac{279.5-300}{\sqrt{200}}\right) \\ &= P(Z < 1.44957) - P(Z < -1.44957) \\ &= P(Z < 1.44957) - [1 - P(Z < 1.44957)] \\ &= 2P(Z < 1.44957) - 1 \\ &= 2 \times 0.92641 - 1 \\ &= 0.85282 \end{aligned}$$

