SOLUTIONS TO EXERCISES IN GOLDBERGER'S "A COURSE IN ECONOMETRICS"

This 'unofficial' set of solutions may contain typos or errors.

Chapter 2

2.1 0.61

2.2 **(a)** 0.15; **(b)** 0.5; **(c)** 0.85

2.3 0.35

2.4 **(a)** 1/3; **(b)** 0; **(c)** 4/21

2.5 0.2; 0.5

2.6 **(a)** $S = \{(Head, 1), (Head, 2), ..., (Tail, 6)\}$; **(b)** 5/12

2.7 Hint: You may define: $X = 1$ if a person has been unemployed and $X = 0$ otherwise.

2.8 **(a)** 0.4, 0, 1, 0.6, 0, 1, 0.6; **(b)** 1/9, 1/9, 1/3, 4/9, etc.; **(c)** 0.48, 0.16, 1, 0.52, 0.16, 1, 0.52

2.9 **(a)** 0.3456, 0.3456, 0.1296; **(b)** 0.251, 0.1255, 0.0471

2.10 **(a)** 1/4, 1/4, 0, 1/4, 1/2; **(b)** 1/4, 1/4, 0, 1/2, 0

Chapter 3

3.2 Hint: use table 3.1 on page 28.

3.3 5/3, 5, 20/9

3.4 4/3, 2, 2/9

3.5 1/2

3.6 1/2

3.7 **(a)** (i) 1, 1/4; (ii) 1/2, 1/4; (iii) 3/4, 1/4; **(b)** (i) 1/2, 0; (ii) exp(-2), exp(-3) (iii) 0, 0.047

Chapter 4

4.1 **(a)** $3\left(2x^2+1\right)/22$; **(b)** $3\left(8/3+2y\right)/11$; **(c)** $2\left(x^2+y\right)/\left(2x^2+1\right)$

4.2 $P(A) = 19/44$; $P(A|x) = \left(1+4x^2\right)/\left(4+8x^2\right)$

4.3 $\left(x^2+y\right)/\left(8/3+2y\right)$

Chapter 5

5.1 **(a)** $\left(2+3x^2\right)/\left(3+6x^2\right)$; **(b)** $\mathrm{Cov}(X,Y) = -2/121$

5.2 **(a)** $\mathrm{E}(Y|x=1) = 0.5$, $\mathrm{E}(Y|x=2) = 0.75$, $\mathrm{E}(Y|x=3) = 0.5$; **(b)** 0.6

5.3 **(a)** 42, 2500, 500, 3000; **(b)** $\mathrm{E}^*(X|Z) = Z$; **(c)** 54; **(d)** $\mathrm{E}^*(Z|X) = 7 + 5/6X$; **(e)** 52

5.4 $\mathrm{E}^*(Y|X) = 6 + (5/7)X$, $\mathrm{E}^*(Y|Z) = (6/7)Z$

5.6 True

5.7 Here

5.8 Here

Chapter 6

6.1 **(a)** True; **(b)** False, $\mathrm{E}\left(W^2\right) = p_1 + 2p_1p_2 + p_2$.

6.7 **(a)** $\mathrm{E}\left(Y|\,X\right) = 1 + X^2$, $\mathrm{E}^*\left(Y|\,X\right) = 2$; **(b)** $\mathrm{E}\left(Y|\,X\right) = 1 + X^2$, $\mathrm{E}^*\left(Y|\,X\right) = 2 + X$; **(c)** Hint (why the BLP has changed?): notice that $\mathrm{E}\left(X^3\right) > 0 \Rightarrow X$ has a right-skewed distribution (the right tail is longer). Also, consider the explanation given in the exercise 5.1 e).

Chapter 7

7.3 **(a)** 4; **(b)** 6; **(c)** 16; **(d)** 16; **(e)** 0.841; **(f)** 0.691; **(g)** 0.813 Here

7.4 0.732

7.5 Here

7.6 **(a)** $50/3 + (5/6)\,Y_1$; **(b)** 170/3; **(c)** No Here

7.7 0.66 Here

Chapter 8

8.1 Here (skip this exercise)

8.2 7/3; 11/27

8.3 **(a)** $\mathrm{E}\left(X\right) = 0.5$, $\mathrm{Var}\left(X\right) = 0.25$, $P\left(A\right) = 0.5$; **(b)** $\mathrm{E}\left(X\right) = 0.5$, $\mathrm{Var}\left(X\right) = 0.25$, $P\left(A\right) = 0.158$; **(c)** $\mathrm{E}\left(X\right) = 0.5$, $\mathrm{Var}\left(X\right) = 0.25$, $P\left(A\right) = 0.148$

8.4 **(a)** $\mathrm{E}\left(\bar{X}\right) = 0.5$, $\mathrm{Var}\left(\bar{X}\right) = 0.025$, $P\left(A\right) = 0.451$; **(b)** $\mathrm{E}\left(\bar{X}\right) = 0.5$, $\mathrm{Var}\left(\bar{X}\right) = 0.025$, $P\left(A\right) = 0.999$; **(a)** $\mathrm{E}\left(\bar{X}\right) = 0.5$, $\mathrm{Var}\left(\bar{X}\right) = 0.025$, $P\left(A\right) = 0.47$.

8.6 **(b)** $\mathrm{E}\left(T\right) = 1/2$, $\mathrm{Var}\left(T\right) = 1/16$.

8.7 **(a)** $\mathrm{E}\left(1/\bar{X}\right) \geq 1/\mathrm{E}\left(\bar{X}\right)$; **(b)** $\mathrm{E}\left(T\right) = \frac{n\lambda}{n-1}$; $\mathrm{Var}\left(T\right) = \frac{n^2\lambda^2}{(n-2)(n-1)^2}$ Here

Chapter 9

9.2 0.977

9.3 **(a)** Use S1; **(b)** $\sqrt{n}\left(u_n - \lambda\right) \xrightarrow{d} N\left(0, \lambda^2\right)$; **(c)** 0.841; **(d)** 0.781

9.4 0.818

9.5 0.135

9.6 **(a)** $\mathrm{E}\left(e\right) = 0$, $\mathrm{E}\left(e^2\right) = 49$, $\mathrm{Var}\left(e\right) = 49$; **(b)** 0.954

Chapter 10

10.2 **(a)** $\bar{x} = 1$, $\bar{y} = 4$, $s_x^2 = 4$, $s_y^2 = 45$, $s_{xy} = 12$; **(b)** $\hat{y} = 1 + 3x$

10.3 You may skip this exercise. Nevertheless, here is the solution:

x	p(x)	mY|x	x*p(x)	mY|x*p(x)	x^2*p(x)	x*mY|x*p(x)
0.5	0.041	-0.012	0.0205	-0.00049	0.01025	-0.000246
1.5	0.093	0.065	0.1395	0.006045	0.20925	0.0090675
2.5	0.093	0.048	0.2325	0.004464	0.58125	0.01116
3.5	0.082	0.099	0.287	0.008118	1.0045	0.028413
4.5	0.113	0.079	0.5085	0.008927	2.28825	0.0401715
5.5	0.103	0.083	0.5665	0.008549	3.11575	0.0470195
6.7	0.155	0.112	1.0385	0.01736	6.95795	0.116312
8.8	0.155	0.129	1.364	0.019995	12.0032	0.175956
12.5	0.113	0.154	1.4125	0.017402	17.65625	0.217525
17.5	0.052	0.161	0.91	0.008372	15.925	0.14651
sum	1		6.4795	0.09874	59.75165	0.7918885
mX	6.4795					
mY	0.09874					
Sx^2	17.76773					
Sxy	0.152103					
B	0.008561					
A	0.043272					

10.4 **a)** $\beta = 3$, $\alpha = 1$; **b)** $P(A_1) = 0.599$, $P(A_2) = 0.977$, $P(A_3) = 0.841$

Chapter 11

11.4 41 and 59

11.5 $T = \frac{2}{9}\bar{Y}_1 + \frac{7}{9}\bar{Y}_2$

11.6 **a)** 4, 270, 9; **b)** Using S, 4 ± 5.78; Using S^*, 4 ± 5.88

11.7 **a**) 0.35, 0.229, 0.0022; **b)** 0.35 ± 0.0935

11.8 **a)** $\bar{X}$, yes; **b)** $1/\bar{X}$ is consistent but biased; **c)** $5/3 \pm 1.96\frac{5/3}{\sqrt{50}}$

11.10 & 11.11 Here

Chapter 12

12.4 Here