B.E. International Program

Faculty of Economics, Thammasat University

Semester: 2/2013
EE325 Introductory Econometrics (Section 2)
Homework#1 (Due on 4 February, 2014 in class)

1. Let OUTPUT be the quantity demanded for rice in Thailand (tons). Express quantity demanded for rice as a function of independent variables, explain and indicate the relationship between quantity demanded for rice and those independent variables.

2. Express the following terms in summation notation:

2.1 $x_1 + x_2 + x_3 + x_4 + \ldots + x_{100}$

2.2 $x_2 y_3 + x_3 y_4 + x_4 y_5 + x_5 y_6$

2.3 $(x_1 - y_1) - (x_2 - y_2) - (x_3 - y_3)$

2.4 $x_2 y_2^2 + x_3 y_3^2 + y_3 x_3^2 + y_4 x_4^2$

2.5 $x_1^2 + x_2^4 + x_3^8 + x_4^{16} + x_5^{32}$

2.6 $4x_1 + 8x_2 + 16x_3$

Simplify the following terms:

2.7 $\sum_{i=1}^{4} (a + bx_i + cy_i)$

2.8 $\sum_{i=4}^{7} (-1)^{-i} x_i y_i$

2.9 $\sum_{x=0}^{4} f(x, y)$

2.10 $\sum_{x=2}^{4} \sum_{y=1}^{2} (x + 2y)$

3. Let X be the discrete random variable with the probability density function as follows:

X	-2	-1	0	1	2	3	4
$f(x)$	0.5a	a	2.25a	2a	1.5a	0.5a	0.25a

If a is a constant, find:

3.1 What is the value of a and why?

3.2 Find $P(X \le 3)$

3.3 Find $P(-2 \le X \le 2)$

3.4 Find $P(X \ge 0)$

4. Let X and Y be continuous random variables and their joint probability distribution function is

$$f(x,y) = \frac{3}{2}xy^2 \text{, where } 0 \le x \le 2, \quad 0 \le y \le 1$$

Find E(X) and Var(X)

5. Let X and Y be discrete random variables and their joint probability function $f(x,y)$ is as following:

		X	
		1	2
Y	0	$\frac{2}{8}$	$\frac{5}{8}$
	1	$\frac{1}{8}$	0

5.1 Find $E(X|Y=1)$ and $E(X^2|Y=1)$

5.2 Find $\text{var}(X|Y=1)$

5.3 Find Marginal pdf of *X* and Marginal pdf of *Y*

5.4 Are *X* and *Y* independent?

5.5 Find $\text{var}(X-Y)$

6. Let *X* be continuous random variable with probability density function as following:

$$f(x) = \begin{cases} \frac{6}{9} - \frac{2}{9}x, & 0 \le x \le 3 \\ 0 \quad , & \text{Otherwise} \end{cases}$$

6.1 Plot $f(x)$

6.2 Find $P(X=2)$

6.3 Find $P(1 \le X \le 2)$

6.4 Find the expected value of *X*

6.5 Find variance of X

7. From midterm exam of EE325 last semester, the score was normally distributed with expected value of 50 and variance of 100, find:

7.1 Probability that a student in that class will receive the score lower than 40

7.2 Students will pass this course with the score of more than 30. Find the probability that a student will pass this course

7.3 If there is an adjustment of this midterm exam score by adding 5 points to each of the student, will this adjustment change the distribution, mean, and variance of the score? If yes, what are the new values?

7.4 Probability that a student will not pass the course after the score adjustment

8. Let X_1, X_2 and X_3 be independent random variable with mean μ and variance σ^2. $\tilde{X}$ is the estimator for the mean where

$$\tilde{X} = \frac{1}{3}X_1 + \frac{2}{3}X_2$$

8.1 Show that $\tilde{X}$ is unbiased estimator of μ

8.2 Let $\overline{X} = \frac{\left(\sum_{i=1}^{3} X_i\right)}{3}$ be another estimator of mean. Show that $\overline{X}$ is an unbiased estimator of μ

8.3 Find $Var(\tilde{X})$, $Var(\overline{X})$, $MSE(\tilde{X})$ and $MSE(\overline{X})$

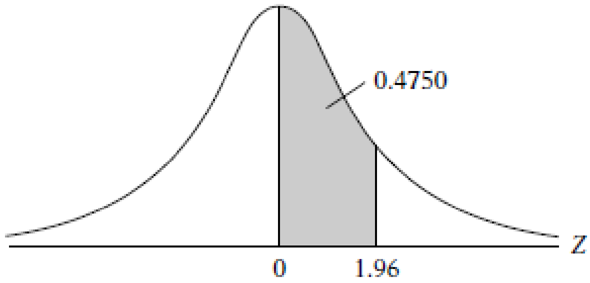
8.4 Between $\tilde{X}$ and $\overline{X}$, which one is better estimator and why?

TABLE D.1 AREAS UNDER THE STANDARDIZED NORMAL DISTRIBUTION

Example

$\Pr(0 \le Z \le 1.96) = 0.4750$

$\Pr(Z \ge 1.96) = 0.5 - 0.4750 = 0.025$



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4454	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Note: This table gives the area in the right-hand tail of the distribution (i.e., $Z \ge 0$). But since the normal distribution is symmetrical about $Z = 0$, the area in the left-hand tail is the same as the area in the corresponding right-hand tail. For example, $P(-1.96 \le Z \le 0) = 0.4750$. Therefore, $P(-1.96 \le Z \le 1.96) = 2(0.4750) = 0.95$.