Prince of Songkla University
Department of Industrial Engineering, Faculty of Engineering

Mid Term Examination: Semester 1	Academic Year: 2004
Date: 1 August 2004	Time: 13.30 – 16.30
Subject: 225-491 Problem Solving with Statistical Techniques	Room: R 300

> ทุจริตในการสอบ โทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียนหนึ่งภาคการศึกษา

Instructions: Read carefully
1. All materials are allowed.
2. There are 4 problems, do all of them. Also show your work clearly and legibly.
3. Answer the questions in the answer book, only.
4. You must write your name and your student ID in every page of the test.
5. Total score is 100 points.

Distribution of Score

Problem	Points
1	25
2	25
3	25
4	25

Tests are prepared by
Nikorn Sirivongpaisal

Name _____ Student ID _____

Problem 1: (25 points) Answer these following questions.
(a) Explain the goal in business management. And how does it relate to Quality?
(b) Explain the conditions, which can cause the satisfied customer.
(c) Explain the Total Customer Satisfaction (TCS) model.
(d) Explain the concept used to define "customer" in problem solving process.
(e) Explain the quality management process.

Problem 2: (25 points) The following data represent company customers' claim of automobile parts from January 2004 to June 2004.

Stratified by types of claim: unit (pieces)

Types of Claim	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
Technical	4	3	3	6	5	11
Transportation	22	16	28	20	48	35
Others	0	1	2	1	0	4

Stratified by cost: unit (Baht)

Types of Claim	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
Technical	3,500	1,600	1,462	4,800	7,831	4,658
Transportation	18,000	13,000	45,000	15,550	59,800	43,250
Others	0	130	640	160	0	1952

Also there are additional data collected about claim on transportation, which represent in the following tables.

Stratified by claim on transportation: unit (pieces)

Part	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
A	3	2	3	1	1	2
B	1	0	1	2	1	0
C	2	1	3	4	10	8
D	1	0	2	1	1	0
E	2	1	0	1	1	1
F	3	4	4	4	8	4
G	10	8	15	7	26	20

Stratified by cost of transportation claim: unit (Baht)

Part	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
A	2,016	1,344	2,016	672	672	1,344
B	107	0	107	214	107	0
C	700	350	1,050	1,400	3,500	2,800
D	535	0	1,070	535	535	0
E	1,344	672	0	672	672	672
F	1,605	2,140	2,140	2,140	4,280	2,140
G	230	184	345	161	598	460

From these provided data, analyze them to define problem theme. You can made any reasonable assumption in your analysis.

Name _____ Student ID _____

Problem 3: (25 points) In small bakery factory, there are two operators who named A and B, and have responsible for making bread. Also, there is only one machine used for making bread. One of the important quality characteristics of bread is weight, which customers pay attention to. The data collected during 20 days from two operators who worked on the same machine have been represented in the following table. Bread are randomly sampled 4 pieces a day and weighted. Weight specification limit is between 200 and 225 grams.

Day	Operator	Weight (grams)			
1	A	209.2	209.5	210.2	212.0
2	A	208.5	208.7	206.2	207.8
3	A	204.2	210.2	210.5	205.9
4	B	204.0	203.3	198.2	199.9
5	B	209.6	203.7	213.2	209.6
6	A	208.1	207.9	211.0	206.2
7	A	205.2	204.8	198.7	205.8
8	B	199.0	197.7	202.2	213.1
9	B	197.2	210.6	199.5	215.3
10	B	199.1	207.2	200.6	201.2
11	A	204.6	207.0	200.8	204.6
12	B	214.7	207.5	205.8	200.9
13	B	204.1	196.6	204.5	199.4
14	A	200.2	205.5	208.0	202.7
15	A	201.1	209.2	205.5	200.0
16	A	201.3	203.1	196.3	205.5
17	B	202.2	204.4	202.1	206.6
18	B	194.1	211.0	208.4	202.6
19	B	204.8	201.3	208.4	212.3
20	A	200.6	202.3	204.3	201.4

From the above data, do you think whether data are stability or not? And can you define the problem theme from these data?

Problem 4: (25 points) The following data represent the percentage breakdown of machine in tuna plant of canned food manufacturing.

Month	% Breakdown	Month	% Breakdown
Jan 2003	15.50	Oct 2003	13.40
Feb 2003	8.90	Nov 2003	13.60
Mar 2003	12.60	Dec 2003	13.73
Apr 2003	11.10	Jan 2004	13.40
May 2003	9.99	Feb 2004	12.13
Jun 2003	11.25	Mar 2004	13.12
Jul 2003	12.27	Apr 2004	12.57
Aug 2003	11.62	May 2004	12.62
Sep 2003	11.60		

Define the baseline of the current percentage breakdown of this machine and set the target for solving breakdown problem.