

UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2004/2005

Mac 2005

RPG 131E Applied Quantitative Methods
(Kaedah Kuantitatif Gunaan)

Duration: 3 hours
(Masa: 3 jam)

Please check that this examination paper consists of **FOURTEEN** pages of printed material before you begin the examination.

*Sila pastikan bahawa kertas peperiksaan ini mengandungi **EMPAT BELAS** muka surat yang tercetak sebelum anda memulakan peperiksaan ini.*

Students are allowed to answer all questions in English OR in Bahasa Malaysia OR in both languages.

Pelajar dibenarkan menjawab semua soalan dalam Bahasa Inggeris ATAU Bahasa Malaysia ATAU kombinasi kedua-duanya.

Instructions: Answer **Section A (COMPULSORY)**
Answer **ONE** question from **Section B**.

Arahan: Jawab **Bahagian A (WAJIB)**
Jawab **SATU** soalan daripada **Bahagian B**.

Section A (COMPULSORY)
Bahagian A (WAJIB)

1. (a) Explain Type I and Type II errors.

Terangkan Ralat I dan Ralat II.

(4 marks/markah)

- (b) A bowl contains 17 red beads, 10 white beads, 20 blue beads and 3 black beads. If one of these beads is drawn at random, what are the probabilities that it would be:-

- (i) red?
- (ii) blue or white?
- (iii) black?
- (iv) neither white nor black?

Sebuah mangkuk mengandungi 17 manik merah, 10 manik putih, 20 manik biru and 3 manik hitam. Sekiranya satu daripada manik tersebut dipilih secara rawak, apakah kebarangkalian manik itu adalah:-

- (i) merah?
- (ii) biru atau putih?
- (iii) hitam?
- (iv) bukan putih atau hitam?

(5 marks/markah)

Table/Jadual 1(c) : Skyline Construction Total Annual Revenues

Year (Tahun)	Total Annual Revenues (in RM million) [Jumlah Hasil Tahunan (dalam RM juta)]
1990	789
1991	542
1992	769
1993	1093
1994	1175
1995	1067
1996	1166
1997	1426
1998	1521
1999	1601
2000	1692

(c) **Table 1(c)** shows the total annual revenues (in RM million) for Skyline Construction Sdn. Bhd. for the period 1990-2000.

- (i) Based on **Table 1(c)**, plot the original data in a graph.
- (ii) Determine the equation of the trend line
- (iii) Using the same graph, plot the least-squares trend line through the original data.

$$a = \frac{\sum y}{n} \qquad b = \frac{\sum xy}{\sum x^2}$$

Jadual 1(c), menunjukkan jumlah hasil tahunan (dalam RM juta) bagi Skyline Construction Sdn. Bhd. bagi tempuh masa 1990-2000.

- (i) Berdasarkan **Jadual 1(c)**, plotkan data asal di atas graf.
- (ii) Dapatkan persamaan bagi garisan tren
- (iii) Dalam graf yang sama, plotkan garisan tren 'least-squares' melalui data asal.

$$a = \frac{\sum y}{n} \qquad b = \frac{\sum xy}{\sum x^2}$$

(10 marks/markah)

(d) What proportion of the normal distribution is found between:

- (i) the mean and $z = 0.21$?
- (ii) the mean and $z = -2.01$?
- (iii) the mean and $z = 0.55$?

Provide graphics to illustrate your answers.

Berapa peratuskah kawasan di bawah taburan normal berada di antara:

- (i) *min dan $z = 0.21$?*
- (ii) *min dan $z = -2.01$?*
- (iii) *min dan $z = 0.55$?*

Tunjukkan grafik untuk menjelaskan jawapan anda.

(6 marks/markah)

(25 marks/ markah)

2. (a) Seventy six HBP students measured their height in a recent survey. The results indicate a normal distribution with a standard deviation of 0.5. Out of the 76 students, 50 students were males and the rest were females. The average height for the male group is 1.7m, and the average height for the female group is 1.5 m.

What is the range of height for the cases below:

- (i) 68.26 % Total male cases
- (ii) 95.44 % Total female cases
- (iii) 99.70 % Total male cases

Tujuh puluh enam pelajar PBP mengukur ketinggian mereka di sebuah kajian. Keputusan menunjukkan taburan normal dengan sisihan piawai sebanyak 0.5. Dari keseluruhan 76 pelajar, 50 adalah lelaki dan selebihnya perempuan. Ketinggian purata kumpulan lelaki adalah 1.7 m dan 1.5 m bagi perempuan.

Apakah julat ketinggian bagi kes-kes berikut:

- (i) 68.26 % *Jumlah kes bagi lelaki*
- (ii) 95.44 % *Jumlah kes bagi perempuan*
- (iii) 99.70 % *Jumlah kes bagi lelaki*

(12 marks/ markah)

(b) Describe the meaning of the following terms:

- (i) Correlation
- (ii) Regression
- (iii) Reliability
- (iv) Validity
- (v) Focus Group

Berikan maksud istilah istilah berikut:

- (i) *Korelasi*
- (ii) *Regresi*
- (iii) *Reliabiliti*
- (iv) *Kesahihan*
- (v) *Kumpulan Fokus*

(5 marks/markah)

(c) Draw a graph showing the relationship between the variables "effort" and "exam results" for the following cases:

Lakarkan graf perhubungan di antara pembolehubah "kerajinan" dan "markah peperiksaan" bagi kes-kes berikut:

- $r = 0.2$
- $r = 0.8$
- $r = 0$
- $r = -0.5$

(8 marks/markah)

3. (a) Describe the meaning of the following terms:

- (i) Applied research
- (ii) Scale
- (iii) Sample
- (iv) Sampling frame
- (v) Data

Berikan maksud istilah berikut:

- (i) *Penyelidikan gunaan*
- (ii) *Skala*
- (iii) *Sampel*
- (iv) *Rangka persampelan*
- (v) *Data*

- (b) Explain the difference between the words given referring to some examples.
- (i) Qualitative and quantitative data.
 - (ii) A sample and a population.
 - (iii) Stratified random sampling and convenience sampling
 - (iv) Discrete and continuous variables
 - (v) Dependent variables and independent variables.

Huraikan perbezaan antara perkataan-perkataan yang diberikan dengan merujuk kepada contoh-contoh.

- (i) *Data kualitatif dan kuantitatif.*
- (ii) *Sampel dan populasi.*
- (iii) *Kaedah persampelan rawak berstrata dan kaedah persampelan mudah*
- (iv) *Pembolehubah tersendiri dan pembolehubah berterusan*
- (v) *Pembolehubah bergantung dan pembolehubah tidak bergantung.*

(25 marks/ markah)

Section B: (Answer only **ONE** question)

Bahagian B: (Jawab **SATU** soalan sahaja)

4. (a) Explain the null hypothesis and the alternative hypothesis. Use an example to illustrate your answer.

Terangkan hipotesis null dan hipotesis alternatif. Gunakan satu contoh untuk menjelaskan jawapan anda.

(3 marks/ markah)

- (b) A conditional profit table shows the profits accrued by a retailer resulting from any possible combination of supply and demand in the market. As shown in **Table 4 (b)**, profits are conditional as a result of taking a specific stock action (ordering 11, 12, 13 or 14 boxes of oranges) and selling a specific number of boxes (11, 12, 13 or 14 boxes of oranges) per day. The probabilities of sales for the respective number of boxes are as follows:

Number of Boxes (<i>Bilangan Kotak</i>)	11	12	13	14
Probability of Sales (<i>Kebarangkalian Jualan</i>)	0.15	0.20	0.40	0.25

**Table 4(b): Conditional Profit Table of Stocking and Selling Oranges
(Jadual 4(b): Jadual Keuntungan Bersyarat dari Pengambilan Stok dan Penjualan Limau)**

Possible Demands (sales) in boxes (Permintaan yang bermungkinan (jualan) dalam bilangan kotak)	Possible Stock Action (Pengambilan Stok yang Berkemungkinan)			
	11 boxes (kotak) (RM)	12 boxes (kotak) (RM)	13 boxes (kotak) (RM)	14 boxes (kotak) (RM)
11	400	380	360	340
12	400	430	410	390
13	400	430	460	440
14	400	430	460	490

From **Table 4(b)**, calculate the following:

- (i) Expected profit from stocking 11 boxes of oranges.
- (ii) Expected profit from stocking 12 boxes of oranges.
- (iii) Expected profit from stocking 13 boxes of oranges.
- (iv) Expected profit from stocking 14 boxes of oranges.
- (v) Explain the meaning of the results to an orange retailer.

Sebuah jadual keuntungan bersyarat menunjukkan keuntungan yang akan diperolehi oleh penjual hasil daripada beberapa kombinasi permintaan dan penawaran di pasaran. Seperti yang ditunjukkan dalam **Jadual 4(b)**, keuntungan bergantung kepada keputusan mengambil bilangan stok yang tertentu (menempah 11, 12, 13 atau 14 kotak limau) dan menjual bilangan stok yang tertentu (11, 12, 13 atau 14 kotak limau) pada setiap hari. Kebarangkalian jualan bagi bilangan kotak limau tertentu adalah seperti berikut:

Daripada **Jadual 4(b)**, kira perkara-perkara berikut:

- (i) Keuntungan dijangka diperolehi daripada mengambil stok 11 kotak limau.
- (ii) Keuntungan dijangka diperolehi daripada mengambil stok 12 kotak limau.
- (iii) Keuntungan dijangka diperolehi daripada mengambil stok 13 kotak limau.
- (iv) Keuntungan dijangka diperolehi daripada mengambil stok 14 kotak limau.
- (v) Terangkan makna keputusan yang didapati kepada seorang penjual limau.

(14 marks/markah)

- (c) **Table 4 (c)** shows information of the E-Z Company's investments compiled from the last 20 years (in RM thousands).
- (i) Calculate a five-year centered moving averages from **Table 4 (c)**.
 - (ii) Plot the original data and the five-year centered moving averages in one graph.
 - (iii) What can you conclude from your graph about E-Z Company's investments?

Table 4 (c): E-Z Company's Investment (in RM thousands)
Jadual 4 (c): Pelaburan Syarikat E-Z (dalam RM ribu)

Year(Tahun)	RM	Year(Tahun)	RM
1985	101	1995	123
1986	108	1996	132
1987	109	1997	114
1988	113	1998	110
1989	119	1999	129
1990	123	2000	211
1991	134	2001	143
1992	192	2002	176
1993	142	2003	198
1994	110	2004	234

Jadual 4 (c) menunjukkan maklumat pelaburan Syarikat E-Z yang dikumpul sejak dua puluh tahun lalu (dalam RM ribu).

- (i) Kira lima-tahun 'centered moving averages' daripada **Jadual 4 (c)**.
- (ii) Plot data asal dan lima-tahun 'centered moving averages' dalam satu graf.
- (iii) Apakah rumusan yang boleh dibuat daripada graf tersebut mengenai pelaburan Syarikat E-Z?

(8 marks/markah)

Table 5 (a): Information on students' participation in sports
[Jadual 5(a): Maklumat pelajar-pelajar yang menyertai sukan tahunan]

Nama:	Jantina	CGPA	Minat terhadap sukan	Ketinggian Lompatan (m)	Kelajuan berlari (m/s)	Pingat
Amy	Lelaki	2.8	Sangat minat	3	2	gangsa
Abdul	Lelaki	3.1	Tidak minat	4	5	perak
Su	Perempuan	3.0	Sangat tidak minat	4	3	gangsa
Sheila	Perempuan	3.4	Tiada pendapat	8	7	emas
Rem	Lelaki	2.5	Tidak minat	9	8	emas
Resh	Perempuan	2.1	Sangat minat	cedera	cedera	
Dany	Lelaki	2.4	Tidak minat	4	5	perak
Deb	Perempuan	3.5	Sangat tidak minat	4	3	perak
Nary	Perempuan	3.2	Tiada pendapat	8	7	emas
Shamy	Perempuan	3.4	Tiada pendapat	9	8	emas
Rick	Lelaki	2.5	Tidak minat	3	2	gangsa
Lin	Perempuan	2.1	Sangat minat	4	5	perak

5. (a) Based on **Table 5 (a)**, what are the scale categories of the following variables

*Berdasarkan **Jadual 5 (a)**, apakah kategori skala pembolehubah-pembolehubah berikut:*

- (i) Gender (*Jantina*)
- (ii) CGPA
- (iii) Opinion on sports (*Minat mengenai sukan*)
- (iv) Height of jump (*Ketinggi Lompatan*)
- (v) Medal (*Pingat*)

(5 marks/markah)

- (b) (i) Which is the independent variable?
(ii) Draw a graph showing the relationship between running speed and height of jump.
(iii) Draw the "line of best fit"
(iv) What is the correlation value between running speed and height of jump?
(v) What conclusion can you make of the relationship?
- (i) *Yang manakah pembolehubah tidak bergantung?*
(ii) *Lakarkan graf perhubungan antara kelajuan berlari dan ketinggian lompatan.*
(iii) *Lakarkan garisan "line of best fit"*
(iv) *Berapakah nilai korelasi antara kelajuan berlari dan ketinggian lompatan?*
(v) *Apakah yang boleh disimpulkan mengenai perhubungan ini?*

(12 marks/markah)

Table/Jadual 5(c)

Number of flags completed (<i>Jumlah bendera yang disediakan</i>)	Number of days spent on creating the flags (<i>Jumlah hari yang digunakan untuk menyiapkan bendera</i>)
10	2
15	3
17	8
19	13
22	15
24	17
27	19

- (c) A group of 30 students worked on creating flags for the National Day Celebration. **Table 5 (c)** indicates the number of days they spend on creating the flags and the number of flags completed.
- (i) What is the value of the "intercept"?
(ii) What is the value of the "regression coefficient"?
(iii) How many flags would they have completed if they spend 25 days working?
(iv) How would you describe the relationship between both variables?

Sekumpulan 30 pelajar membuat bendera sempena sambutan Hari Kebangsaan. **Jadual 5 (c)** menunjukkan jumlah hari yang diperlukan untuk menyiapkan bendera serta jumlah bendera yang disediakan.

- (i) Apakah nilai 'intercept'?
- (ii) Apakah nilai 'koefisien regresi'?
- (iii) Berapa benderakah yang dapat disediakan jika mereka bekerja selama 25 hari?
- (iv) Apakah yang dapat disimpulkan tentang perhubungan kedua-dua pembolehubah tersebut.

(8 markah/marks)

6. (a) What is the level of measurement for each of the following variables?
- (i) Distance students travel to class
 - (ii) Student scores on the first statistics test
 - (iii) A classification of students by state of birth
 - (iv) Number of hour's students study per week
 - (v) A ranking of students by junior and senior.

Apakah aras pengukuran untuk setiap pembolehubah di bawah?

- (i) Jarak perjalanan pelajar ke kelas
- (ii) Pencapaian markah pelajar di dalam ujian pertama statistik
- (iii) Pengklasifikasian pelajar mengikut tarikh lahir
- (iv) Bilangan jam pelajar belajar setiap minggu
- (v) Susunan pelajar mengikut status pelajar baru dan lama.

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- (b) The ages of a sample of patient receiving treatment in the Klinik Perdana are: 32,21,60,47,54,17,72,55,33 and 41.
- (i) Compute the range
 - (ii) Compute the mean deviation
 - (iii) Compute the standard deviation.

Umur bagi sample pesakit yang menerima rawatan di Klinik Perdana adalah: 32,21,60,47,54,17,72,55,33 dan 41.

- (i) *Hitungkan julat*
- (ii) *Hitungkan deviasi purata*
- (iii) *Hitungkan sisihan piawai*

- (c) The following **Table 6 (c)** shows the amount of monthly expenses for a sample of 60 house owners in Gelugor, Penang. Estimate the arithmetic mean amount of expenses and the median amount of payment.

Jadual 6 (c) menunjukkan jumlah perbelanjaan bulanan bagi sampel 60 pemilik rumah di Gelugor, Pulau Pinang. Anggarkan jumlah perbelanjaan purata arithmetic dan jumlah perbelanjaan median.

Table/Jadual 6(c)

Monthly expenses (RM) [Perbelanjaan bulanan (RM)]	Number of house owners (Bilangan pemilik rumah)
100-500	1
500-900	9
900-1,300	11
1,300-1,700	23
1,700-2,100	11
2,100-2,500	4
2,500-2,900	1
Total	60

(25 marks/markah)

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Formula

$$\text{Formula Kaedah Pearson Product Moment (r) = } \frac{N\Sigma xy - (\Sigma x) (\Sigma y)}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2] [N\Sigma y^2 - (\Sigma y)^2]}}$$

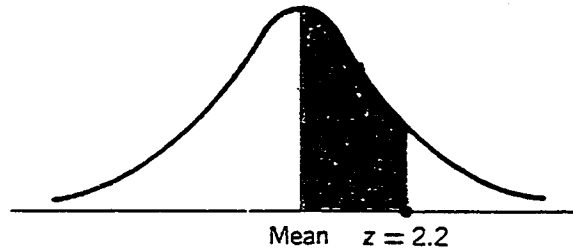
$$y = a + bx$$

$$a = \frac{\Sigma y}{N} - b \frac{\Sigma x}{N}$$

$$b = \frac{N\Sigma xy - (\Sigma x) (\Sigma y)}{N\Sigma x^2 - (\Sigma x)^2}$$

$$Z = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{N}}}$$

Areas under the Standard Normal Probability Distribution
between the Mean and Positive Values of z^*



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	.4554	.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