
UNIVERSITI SAINS MALAYSIA

PEPERIKSAAN KURSUS SEMASA CUTI PANJANG
ACADEMIC SESSION 2007/2008

JUNE 2008

JIB 213 – BIOSTATISTICS
[BIOSTATISTIK]

Duration : 3 hours
[Masa : 3 jam]

Please ensure that this examination paper contains SIX printed pages before you begin the examination.

Ensure formula and tables are enclosed with the question paper.

Answer **FIVE** questions. You may answer **either** in Bahasa Malaysia or in English.

All answers must be written in the answer booklet provided.

Each question is worth 20 marks and the marks for each sub question is given at the end of that question.

Sila pastikan bahawa kertas peperiksaan ini mengandungi ENAM muka surat yang bercetak sebelum anda memulakan peperiksaan ini.

Sila pastikan formula dan rumus disertakan bersama kertas soalan.

*Jawab **LIMA** soalan. Anda dibenarkan menjawab soalan **sama ada** dalam Bahasa Malaysia atau Bahasa Inggeris.*

Setiap jawapan mesti dijawab di dalam buku jawapan yang disediakan.

Setiap soalan bernilai 20 markah dan markah subsoalan diperlihatkan di penghujung subsoalan itu.

1. Diastolic blood pressure X in hypertensive women is estimated at about 180 mm Hg with a standard deviation of 16 mm Hg and is normally distributed.

Tekanan darah diastolik X , wanita hipertensif dianggarkan pada 180 mm Hg, dengan sisihan piawai 16 mm Hg dan taburan adalah normal.

- (a) Find the probability when

Cari kebarangkalian apabila

- (i) $P (X < 90)$
- (ii) $P (X > 90)$
- (iii) $P (96 < X < 104)$

(15 marks)

- (b) Find the value x so that $P (X \leq x) = 0.95$

Cari nilai x supaya $P (X \leq x) = 0.95$

(5 marks)

2. The mean blood cholesterol concentration of a large population of adult males (50 – 60 years old) is 200 mg/dl with a standard deviation of 20 mg/dl. Assume that blood cholesterol measurement is normally distributed.

Min kepekatan kolestrol darah bagi populasi lelaki dewasa (50 – 60 tahun) adalah 200 mg/dl dengan sisihan piawai 20 mg/dl. Andaikan ukuran kolestrol darah bertaburan normal,

- (i) What is the probability that randomly selected individuals from this age group will have a blood cholesterol level below 250 mg/dl?

Apakah kebarangkalian individu dipilih secara rawak daripada kumpulan umur ini akan mempunyai paras kolestrol di bawah 250 mg/dl?

(5 marks)

- (ii) What is the probability that randomly selected individuals from this group will have a blood cholesterol level above 225 mg/dl?

Apakah kebarangkalian individu yang dipilih secara rawak daripada kumpulan ini akan mempunyai paras kolestrol di atas 225 mg/dl?

(5 marks)

- (iii) If a group of 25 men who are strict vegetarians has a mean blood cholesterol level of 188 mg/dl, would you say that these vegetarians have significantly lower blood cholesterol level? Explain.

Jika kumpulan vegetarian terdiri daripada 25 orang lelaki dewasa mempunyai min paras kolestrol darah 188 mg/dl, bolehkah anda membuat kesimpulan bahawa kumpulan vegetarian ini mempunyai paras kolestrol darah yang rendah? Terangkan.

(10 marks)

3. A study on the effects of exercise on the menstrual cycle for 10 female swimmers provides the following ages (in years) of menarche (beginning of menstruation). The swimmers began training at least 1 year prior to menarche :

Kajian kesan senaman ke atas kitaran haid terhadap sepuluh orang perenang wanita menghasilkan umur (tahun) permulaan haid yang berikut. Semua perenang telah memulakan latihan renang sekurang-kurangnya setahun sebelum baligh.

13.6 13.9 14.0 14.2 14.9 15.0 15.0 15.1 15.4 16.4

- (i) Calculate the mean and standard deviation for this data. Construct the 95% confidence interval for the mean above.

Cari nilai min dan sisihan piawai bagi data ini. Bina selang keyakinan 95% bagi min di atas.

(10 marks)

- (ii) Is the sample mean significantly higher than the overall population mean for non swimmers which is 12.5 years? Use the 95% confidence interval to provide your rationale.

Adakah min sampel ini lebih besar secara signifikan daripada min keseluruhan populasi bukan perenang iaitu 12.5 tahun? Gunakan selang keyakinan 95% untuk menyokong alasan anda.

(10 marks)

4. The height and arm span of 10 adult males were measured (in cm). Is there a correlation between these two measurements?

Ketinggian dan panjang depa lengan 10 orang lelaki dewasa diukur (cm). Adakah terdapat korelasi antara kedua-dua ukuran tersebut?

Height (cm)	Arm Span (cm)
171	173
195	193
180	188
182	185
190	186
175	178
177	182
178	182
192	198
202	202

- (a) Generate a scatter plot of this data.

Lakarkan gambar rajah rawak menggunakan data di atas.

(5 marks)

- (b) Calculate linear correlation value r for this data. Explain.

Hitung nilai korelasi r untuk data ini. Terangkan.

(15 marks)

5. Six garter snakes, *Thamnophis radix*, were observed during the presentation of solutions containing fish mucus, worm mucus and distilled water (dH₂O). The number of tongue flicks during a 5 minute interval of exposure was recorded. The solutions were given to each snake in random order. Data recorded is as follows :

Pemerhatian dilakukan ke atas 6 ekor ular Thamnophis radix, terhadap rangsangan ke atas 3 jenis larutan iaitu, mukus ikan, mukus cacing dan air suling (dH₂O) pada setiap ular secara rawak. Bilangan jeliran lidah oleh ular terhadap larutan dicatat selama 5 minit. Setiap larutan didedahkan kepada ular secara rawak. Data direkod adalah seperti berikut :

Snake	Number of tongue flicks		
	Fish mucus	Worm mucus	dH ₂ O
1	13	18	8
2	9	19	12
3	17	12	10
4	10	16	11
5	13	17	12
6	11	14	12

Test if there are any significant differences in the number of tongue flicks among the snakes towards the different solutions at 90% level of confidence ($\alpha = 0.10$)

Uji sama ada terdapat perbezaan bilangan jeliran lidah di antara ular-ular tersebut terhadap larutan yang berlainan pada aras keertian 90% ($\alpha = 0.10$).

(20 marks)

6. A study was conducted in Pulau Redang, to examine the distribution of animals associated with different species of coral. Three species of coral, *Pocillopora eydouxi*, *Acropora sp.*, *Acropora aspera* were selected and sampled. The number of snails of species A and B associated with each coral species were recorded. Is the distribution of the two snail species the same for all three coral species? Use the data below to test the hypothesis at $\alpha = 0.05$ level. Clearly state the hypotheses and interpret the results by using Chi Square test.

Satu penyelidikan telah dijalankan ke atas batu karang di Pulau Redang. Taburan haiwan berhubung dengan batu karang yang berlainan dikaji. Tiga spesies batu karang *Pocillopora eydouxi*, *Acropora sp.*, *Acropora aspera* dipilih sebagai sampel. Bilangan siput dari spesies A dan spesies B yang berada di batu karang tersebut direkod. Adakah taburan siput dari kedua-dua spesies sama bagi setiap batu karang? Gunakan data di bawah untuk menguji hipotesis pada aras keertian $\alpha = 0.05$. Nyatakan dengan jelas hipotesis dan kesimpulan kajian dengan menggunakan ujian Chi Square.

Coral Snails	Number of Associations			Total
	<i>Pocillopora eydouxi</i>	<i>Acropora sp.</i>	<i>Acropora aspera</i>	
Species A	6	2	14	22
Species B	7	21	1	29
Total	13	23	15	51

(20 marks)