UNIVERSITI SAINS MALAYSIA

Final Examination
Academic Session 2008/2009

April 2009

JIB 213 – BIOSTATISTICS
[BIOSTATISTIK]

Duration : 3 hours
[Masa : 3 jam]

Please ensure that this examination paper contains **TEN** 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 English.

All answers must be written in the answer booklet provided.

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

*Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEPULUH** 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 setiap subsoalan diperlihatkan di penghujung subsoalan itu.

1. (a) Assume that the body temperature of a human population has a mean of 98.6 °F and the standard deviation is 0.62 °F. If a sample of size n = 106 is randomly selected, find the probability of getting a mean of 98.2 °F or **lower** at level of confidence, $\alpha = 0.05$

[10 marks]

Andaikan suhu badan populasi manusia mempunyai nilai min 98.6 °F dan sisihan piawai 0.62 °F. Jika saiz sampel n = 106 dipilih secara rawak, hitung nilai kebarangkalian untuk mendapatkan nilai min 98.2 °F atau ***kurang*** *pada aras keertian,* $\alpha = 0.05$

[10 markah]

(b) In an ecological study of grasses, each quadrant was 1 meter square.

Table 1 shows the number of sedge plants, *Carex flacea* found in 800 sample quadrants.

Table 1 : Frequency of *Carex flacea* in 800 quadrants.

Plants / Quadrants (X_i)	Frequency (f_i)
0	268
1	316
2	135
3	61
4	15
5	3
6	1
7	1

Calculate the descriptive statistic of :-

(i) Mean sample
(ii) Variance and standard deviation sample.

[10 marks]

...3/-

Dalam suatu kajian ekologi berkenaan tumbuhan rumput, setiap kuadrat mempunyai keluasan satu meter persegi.

Jadual 1 menunjukkan bilangan tumbuhan rumput Carex flacea yang ditemui pada 800 sampel kuadrat.

Jadual 1 : Kekerapan Carex flacea dalam 800 kuadrat.

Tumbuhan / Kuadrat (X_i)	*Kekerapan (f_i)*
0	*268*
1	*316*
2	*135*
3	*61*
4	*15*
5	*3*
6	*1*
7	*1*

Hitung nilai deskriptif statistik bagi :

(i) Min sampel
(ii) Varian dan sisihan piawai sampel.

[10 markah]

2. In testing the effectiveness of a nasal spray vaccine towards flu among children, the sample data is summarized in Table 2.

Table 2 : Testing effectiveness of vaccine

	Sample Size	Developed Flu
Vaccine treatment group	1070	14
Placebo treatment group	532	95

Use the P-value method of hyphotesis testing at $\alpha = 0.05$ significant level to test the claim that the flu cases amongst the vaccinated children **is less** than the group of children given a placebo treatment.

[20 marks]

Penilaian keberkesanan vaksin semburan nasal terhadap selesema di kalangan kanak-kanak dikaji dan data sampel dirumus dalam Jadual 2.

Jadual 2 : Keberkesanan ujian vaksin

	Saiz Sampel	*Jangkitan Selsema*
Kumpulan rawatan vaksin	*1070*	*14*
Kumpulan rawatan plasebo	*532*	*95*

*Gunakan kaedah hipotesis nilai-P pada aras keertian, $\alpha = 0.05$ untuk menguji dakwaan yang menyatakan kes selesema terhadap kanak-kanak yang diberikan vaksin adalah **rendah** daripada kumpulan kanak-kanak yang diberikan rawatan plasebo.*

[20 markah]

3. Table 3 shows the result obtained from an experiment to determine two different types of corn seed. Regular and Kiln Dried corn seeds were used on adjacent plots of land with yields in pounds per acre.

Use a 0.05 significance level to test the claim that the types of corn seed affect the yield of corn. (Use the values given below).

Table 3 : Yield of corn from different seeds.

Regular	Kiln Dried	Difference, d
1903	2009	−106
1935	1915	20
1910	2011	−101
2496	2463	33
2108	2180	−72
1961	1925	36
2060	2122	−62
1444	1482	−38
1612	1542	70
1316	1443	−127
1511	1535	−24

Remarks : N = 11

$\bar{d} = -33.727$

Standard deviation, $S_d = 66.171$

[20 marks]

...5/-

Jadual 3 menunjukkan hasil uji kaji untuk menilai perbezaan dua jenis biji jagung. Jenis biji jagung 'Regular' dan 'Kiln Dried' disemai pada petak sebidang tanah dengan hasilan dalam unit paun seekar.

Gunakan aras keertian, $\alpha = 0.05$ untuk menguji dakwaan bahawa jenis biji jagung mempengaruhi pengeluaran jagung. (Gunakan nilai yang diberikan di bawah).

Jadual 3 : Pengeluaran jagung daripada biji benih yang berbeza.

Regular	*Kiln Dried*	*Perbezaan, d*
1903	*2009*	*–106*
1935	*1915*	*20*
1910	*2011*	*–101*
2496	*2463*	*33*
2108	*2180*	*–72*
1961	*1925*	*36*
2060	*2122*	*–62*
1444	*1482*	*–38*
1612	*1542*	*70*
1316	*1443*	*–127*
1511	*1535*	*–24*

Catatan : $N = 11$

$\bar{d} = -33.727$

Sisihan piawai, $S_d = 66.171$

[20 markah]

...6/-

4. Fourteen second year medical students took blood pressure of the same patient and results are listed in Table 4.

Table 4 : Blood pressure measurement.

Systolic	Diastolic
138	82
130	91
135	100
140	100
120	80
125	90
120	80
130	80
130	80
144	98
143	105
140	85
130	70
150	100

Calculate the correlation between systolic and diastolic values of the patient.

[20 marks]

Empat belas pelajar perubatan tahun dua mengukur tekanan darah seorang pesakit yang sama dan keputusan adalah seperti Jadual 4.

Jadual 4 : Ukuran Tekanan Darah

Sistolik	*Diastolik*
139	*82*
131	*91*
136	*100*
140	*100*
120	*80*
125	*90*
120	*80*
130	*80*
130	*80*
144	*98*
143	*105*
140	*85*
130	*70*
150	*100*

Hitung nilai korelasi antara nilai sistolik dan diastolik pesakit tersebut.

[20 markah]

5. Table 5 represents length (cm) and weight (kg) of 8 male bears.

Table 5 : Length and Weight of Male Bears.

Bear Number	Length (cm)	Weight (kg)
1	53.0	80
2	67.5	344
3	72.0	416
4	72.0	348
5	73.5	262
6	68.5	360
7	73.0	332
8	37.0	34

(a) Based on the data, is there an association between the length of a bear and its weight? What is that association? Prove your statement.

[5 marks]

(b) Using a regression equation, predict the weight of a bear if its length is 71.0 centimeter (cm).

[15 marks]

Jadual 5 mewakili data ukuran panjang badan (cm) dan berat (kg) 8 ekor beruang jantan

Jadual 5 : Panjang (cm) dan berat (kg) beruang jantan.

Bilangan Beruang	*Panjang (cm)*	*Berat (kg)*
1	*53.0*	*80*
2	*67.5*	*344*
3	*72.0*	*416*
4	*72.0*	*348*
5	*73.5*	*262*
6	*68.5*	*360*
7	*73.0*	*332*
8	*37.0*	*34*

(a) Berdasarkan data ini, adakah terdapat hubungan antara panjang dan berat badan beruang? Apakah hubungan itu? Buktikan kenyataan anda.

[5 markah]

(b) Dengan menggunakan persamaan regresi, jangkakan berat badan beruang jika panjangnya 71.0 sentimeter (cm).

[15 markah]

6. Based on Mendel's Law, offsprings are expected to have a genotype distribution in Table 6 (a).

Table 6 (a) : Expected Genotype

25%	AA
50%	Aa
25%	aa

Out of 145 offsprings obtained, the following genotypes were found as shown in Table 6 (b).

Table 6 (b) : Observed Genotype

20 offsprings	AA
90 offsprings	Aa
35 offsprings	aa

Test the claim that the observed genotypes fit Mendel's Law at the significance level, $\alpha = 0.05$

[20 marks]

Berdasarkan Hukum Mendel, anak yang lahir dijangka mempunyai taburan genotip seperti Jadual 6 (a).

Jadual 6 (a) : Genotip Jangkaan

25%	*AA*
50%	*Aa*
25%	*aa*

Daripada 145 zuriat yang diperolehi, genotip anak yang dihasilkan adalah seperti yang ditunjukkan dalam Jadual 6 (b).

Jadual 6 (b) : Genotip Pemerhatian

20 zuriat	*AA*
90 zuriat	*Aa*
35 zuriat	*aa*

Uji dakwaan yang mengatakan genotip pemerhatian mematuhi Hukum Mendel pada aras keertian, $\alpha = 0.05$

[20 markah]

- oooOooo -