FINAL EXAMINATION / *PEPERIKSAAN AKHIR*
SEMESTER 2 – SESSION 2018 / 2019
PROGRAM KERJASAMA

COURSE CODE : DDWG 2213 / DDPG 2213
KOD KURSUS

COURSE NAME : BUSINESS STATISTICS / *STATISTIK PERNIAGAAN*
NAMA KURSUS

YEAR / PROGRAMME : 2 DDWG
TAHUN / PROGRAM

DURATION : 2 HOURS 30 MINUTES / *2 JAM 30 MINIT*
TEMPOH

DATE : APRIL 2019
TARIKH

INSTRUCTION/*ARAHAN* :

1. Answer **ALL** questions in Part A and only **TWO** (2) questions in **Part B** in the **answer booklet**.
   *Jawab **SEMUA** soalan di **Bahagian A** dan hanya **DUA** (2) sahaja di **Bahagian B** dalam **buku jawapan**.*

2. A list of statistics formula is attached for reference.
   Senarai rumus statistik dilampirkan sebagai rujukan.

(You are required to write your name and your lecturer's name on your answer script)
(Pelajar dikehendaki tuliskan nama dan nama pensyarah pada skrip jawapan)

STUDENT'S NAME *NAMA PELAJAR*	:	
I.C NO. / *NO. K/PENGENALAN*	:	
YEAR / PROGRAMME *TAHUN / PROGRAM*	:	
COLLEGE *KOLEJ*	:	
LECTURER'S NAME *NAMA PENSYARAH*	:	

This examination paper consists of 11 pages including the cover
Kertas soalan ini mengandungi 11 muka surat termasuk kulit hadapan

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan
Profesional dan
Pendidikan Berterusan
(*UTMSPACE*)

PUSAT PROGRAM KERJASAMA

PETIKAN DARIPADA PERATURAN AKADEMIK
ARAHAN AM - PENYELEWENGAN AKADEMIK

1. SALAH LAKU SEMASA PEPERIKSAAN

1.1 Pelajar tidak boleh melakukan mana-mana salah laku peperiksaan seperti berikut :-

1.1.1 memberi dan/atau menerima dan/atau memiliki sebarang maklumat dalam bentuk elektronik, bercetak atau apa jua bentuk lain yang tidak dibenarkan semasa berlangsungnya peperiksaan sama ada di dalam atau di luar Dewan Peperiksaan melainkan dengan kebenaran Ketua Pengawas; atau

1.1.2 menggunakan makluman yang diperolehi seperti di atas bagi tujuan menjawab soalan peperiksaan; atau

1.1.3 menipu atau cuba untuk menipu atau berkelakuan mengikut cara yang boleh ditafsirkan sebagai menipu semasa berlangsungnya peperiksaan; atau

1.1.4 lain-lain salah laku yang ditetapkan oleh Universiti (seperti membuat bising, mengganggu pelajar lain, mengganggu Pengawas menjalankan tugasnya).

2. HUKUMAN SALAH LAKU PEPERIKSAAN

2.1 Sekiranya pelajar didapati telah melakukan pelanggaran mana-mana peraturan peperiksaan ini, setelah diperakukan oleh Jawatankuasa Peperiksaan Fakulti dan disabitkan kesalahannya, Senat boleh mengambil tindakan dari mana-mana satu yang berikut :-

2.1.1 memberi markah SIFAR (0) bagi keseluruhan keputusan peperiksaan kursus yang berkenaan (termasuk kerja kursus); atau

2.1.2 memberi markah SIFAR (0) bagi semua kursus yang didaftarkan pada semester tersebut.

2.2 Jawatankuasa Akademik Fakulti boleh mencadangkan untuk diambil tindakan tatatertib mengikut peruntukan Akta Universiti dan Kolej Universiti, 1971, Kaedah-kaedah Universiti Teknologi Malaysia (Tatatertib Pelajar-pelajar), 1999 bergantung kepada tahap kesalahan yang dilakukan oleh pelajar.

2.3 Pelajar yang didapati melakukan kesalahan kali kedua akan diambil tindakan seperti di perkara 2.1.2 dan dicadang untuk diambil tindakan tatatertib mengikut peruntukan Akta Universiti dan Kolej Universiti, 1971, Kaedah-kaedah Universiti Teknologi Malaysia (Tatatertib Pelajar-pelajar), 1999.

Section A: Answer ALL questions.   (40 Marks / *Markah)*
(Bahagian A: Jawab SEMUA soalan).

Q1.   The following ordered data are collected from 20 city restaurants for the cost of one
       meal (in RM).
       Data yang tersusun berikut diambil daripada 20 restoran di bandar bagi kos untuk
       setiap hidangan (dalam RM).

25	26	29	32	33	33	35	35	37	39
43	43	43	44	45	48	50	51	53	54

(a) Determine the mean, median and standard deviation for the ungrouped data.
    Tentukan min,median dan sisihan piawai bagi data tak terkumpul.

(b) Construct a stem-and-leaf display of the data.
    Bina rajah dahan dan daun bagi data.

(c) Find the coefficient of variation of the data.
    Dapatkan pekali variasi bagi data.

                                                                                [8 M]

Q2.   Do males or females feel more stressed out at work? A survey of employed adults
       conducted online revealed the following in Table 1.
       Adakah lelaki atau wanita merasai lebih tertekan di tempat kerja? Tinjauan
       terhadap pekerja dewasa dijalankan melalui talian mendedahkan perkara berikut
       dalam Jadual 1.

Gender / *Jantina*	Felt Stressed Out At Work / *Merasa Tertekan Di Tempat Kerja*	
	Yes / *Ya*	No / *Tidak*
Male / *Lelaki*	244	494
Female / *Wanita*	282	480

Table 1 / *Jadual 1*

One of these 1500 employed adults is selected at random. Find the probability that:
Salah seorang daripada 1500 pekerja dewasa dipilih secara rawak. Cari
kebarangkalian bahawa:

(a) The selected employed adult felt stressed out at work was a male.
Pekerja dewasa terpilih merasa tertekan di tempat kerja adalah lelaki.

(b) The selected adult was a female and not felt stressed out at work.
Pekerja dewasa terpilih adalah wanita dan tidak merasa tertekan di tempat kerja.

(c) The selected adult was a male or he felt stressed out at work.
Pekerja dewasa terpilih adalah lelaki atau dia merasa tertekan di tempat kerja.

(d) Given that the employed adult is female, she felt stressed out at work.
Diketahui pekerja dewasa adalah wanita, dia merasa tertekan di tempat kerja.

[8 M]

Q3. A report announced that the mean sales price of new houses sold in a year was
$ 272,500. Assume that the prices is normally distributed and the standard deviation
is $100,000.
Satu laporan mengumumkan bahawa min harga jualan rumah baru terjual
dalam satu tahun adalah $272,500. Anggap bahawa harga tertabur secara normal
dan sisihan piawai ialah $100,000.

(a) What is the probability that the price of new houses is less than $290,000.
Apakah kebarangkalian bahawa harga rumah baru kurang daripada $290,000.

(b) If you select a random sample of 100 new houses, what is the probability that
the sample mean will be between $275,000 and $285,000?
Jika anda memilih sampel rawak 100 rumah baru, apakah kebarangkalian
bahawa min sampel di antara $275,000 dan $285,000?

[8 M]

Q4. A pizza store franchise has found the following data, Table 2, which shows the number of employees at its various stores across the country, y, and the time (months) for which each store has been operated, x .

Satu rangkaian kedai pizza memperolehi data berikut, Jadual 2, yang menunjukkan bilangan pekerja di setiap kedai di seluruh negeri , y , dan masa (bulan) bagi setiap kedai telah beroperasi , x .

Length of time has been operated *Jangka masa kedai beroperasi*	Current number of employee *Bilangan pekerja semasa*
14	15
4	2
36	25
30	22
22	21
12	10
18	16
28	20
30	24
36	24

Table 2 / *Jadual 2*

(a) Calculate the coefficient of correlation between length of time the stores has been operated and the number of employees.

Kira pekali bagi korelasi antara jangka masa kedai telah beroperasi dan bilangan pekerja.

(b) Compute the regression coefficients a and b. Write the least square regression line to predict the number of employees.

Kira pekali regresi a dan b. Tuliskan persamaan garis regresi kuasa dua terkecil untuk meramalkan bilangan pekerja.

(c) Predict the number of employees at a store which has been operated for 25 months.

Ramalkan bilangan pekerja sebuah kedai yang telah beroperasi selama 25 bulan. **[8 M]**

Q5. A manufacturing firm purchases an identical component from three independent suppliers that differ in unit price and quantity supplied. The data from 2012 and 2015 are given in Table 3.

Satu firma pembuatan membeli komponen yang sama daripada tiga pembekal bebas berbeza dari segi harga unit dan kuantiti yang dibekalkan. Data dari tahun 2012 dan 2015 diberikan dalam Jadual 3.

Supplier	Quantity / *Kuantiti*		Unit Price / *Harga Unit*	
Pembekal	2012	2015	2012	2015
A	1500	2500	5.45	6.00
B	2000	2700	5.60	5.95
C	1200	2000	5.50	6.20

Table 3 / *Jadual 3*

(a) Calculate the aggregate quantity index for all components for 2015.

Kira agregat indeks kuantiti untuk semua komponen bagi 2015.

(b) Calculate and interpret the Laspeyres price index for 2015.

Kira dan huraikan indeks harga Laspeyres bagi 2015.

(c) Calculate and interpret the Paasche price index for 2015.

Kira dan huraikan indeks harga Paasche bagi 2015.

[8 M]

Section B: Answer only TWO (2) questions.   (20 Marks / *Markah)*
(Bahagian B: Jawab hanya DUA (2) soalan).

Q1. The owner of a coffee shop wants to study coffee purchasing habits of customers at
     her shop. She selects a random of 60 customers during a certain week. The results
     stated that the amount spent has a sample mean $7.25 and a standard deviation $1.75.
     *Pemilik sebuah kedai kopi mahu mengkaji tabiat membeli kopi pelanggan di
     kedainya. Dia memilih rawak 60 pelanggan dalam minggu tertentu. Keputusan
     menyatakan bahawa jumlah yang dibelanjakan mempunyai min sampel $7.25 dan
     sisihan piawai $1.75.*

     (a) At $\alpha = 0.05$ level of significance, test is there evidence that the population
          mean was different from $6.50.
          *Pada tahap keertian $\alpha = 0.05$, uji samada terdapat bukti bahawa min populasi
          adalah berbeza daripada $6.50.*

     (b) If the sample mean equals $6.25, what is your decision compare to (a)?
          Jika min sampel $6.25, apakah keputusan anda berbanding (a)?

                                                                              [10 M]

Q2. A survey shows the average insurance cost to a company per employee hour is
     $1.84 for managers and $1.99 for professional specialty workers.Suppose these
     figures were obtained from 35 managers and 41 professional specialty workers and
     that their respective population standard deviations are $0.38 and $0.51. Test to
     determine whether there is significant difference in the hourly rates employers pay for
     the insurance between managers and professional specialty workers. Use a 2% level
     of significance. Summary of data statistics shown in Table 4.
     *Satu kajian menunjukkan kos purata insurans syarikat sejam bagi setiap pekerja
     adalah $1.84 bagi pengurus dan $1.99 bagi pekerja khas profesional. Katakan
     angka ini diperolehi daripada 35 pengurus dan 41 pekerja khas profesional dan
     sisihan piawai populasi masing-masing adalah $0.38 dan $0.51. Uji bagi
     menentukan samada terdapat perbezaan yang ketara dalam kadar insurans setiap
     jam majikan bayar di antara pengurus dan pekerja khas profesional. Gunakan
     tahap keertian pada 2%. Ringkasan statistik data dinyatakan dalam Jadual 4.*

                                                                              [10 M]

Statistics / *Statistik*	Managers / *Pengurus*	Professional / *Profesional*
Size / *Saiz*	$n_1 = 35$	$n_2 = 41$
Mean / *Min*	$\bar{x}_1 = 1.84$	$\bar{x}_2 = 1.99$
Variance / *Varians*	$\delta_1^2 = 0.38^2$	$\delta_2^2 = 0.51^2$

Table 4 / *Jadual 4*

Q3. A company has three manufacturing plants, and company officials want to determine whether there is a difference in the average ages of workers at the three locations. The computations shown in the ANOVA in Table 5 are the summary data for the ages of five randomly selected workers at each plant.

Sebuah syarikat mempunyai tiga kilang pembuatan dan pegawai syarikat ingin menentukan samada terdapat perbezaan dalam purata umur pekerja di tiga lokasi. Pengiraan ditunjukkan ANOVA dalam Jadual 5 adalah ringkasan data bagi umur lima pekerja yang dipilih secara rawak di setiap kilang.

Source of Variation *Sumber Variasi*	df *dk*	Sum of Squares *Kuasa dua Jumlah*	Mean of Squares *Kuasa dua Min*
Between/ *Antara*	2	129.73	
Error/ *Ralat*		19.60	
Total/ *Jumlah*	14		

Table 5 / *Jadual 5*

(a) Complete and copy the above ANOVA summary table.
Lengkapkan dan salin jadual ringkasan ANOVA di atas.

(b) How many workers were involved in this survey?
Berapa bilangan pekerja yang terlibat dalam kajiselidik ini?

(c) Determine whether there is a significant difference in the mean ages of the workers at the three plants.Test at 1% level of significance.
Tentukan samada terdapat perbezaan ketara dalam min usia bagi pekerja di ketiga-tiga kilang.Uji pada tahap keertian 1%.   [10 M]

END OF QUESTIONS / *SOALAN TAMAT*

LIST OF FORMULA

DESCRIPTIVE STATISTICS

For Ungrouped Data:

Mean, $\bar{x} = \dfrac{\sum x}{n}$ 　　　　　　Variance, $s^2 = \dfrac{n\sum x^2 - (\sum x)^2}{n(n-1)}$

For Grouped Data:

Mean, $\bar{x} = \dfrac{\sum fx}{\sum f}$ 　　　　　Variance, $s^2 = \dfrac{1}{(\sum f)-1}\left[\sum fx^2 - \dfrac{(\sum fx)^2}{\sum f}\right]$

Median, $\tilde{x} = L + \dfrac{\frac{(\sum f)+1}{2} - f_L}{f_m} \times C$ 　　Mode, $\hat{x} = L + \left(\dfrac{d_1}{d_1+d_2}\right) \times C$

MEASURES OF DISPERSION

Coefficient of Variance, $CV = \dfrac{s}{\bar{x}} \times 100\%$

Coefficient of Skewness, $s_k = \dfrac{\bar{x}-mode}{s}$ 　　or　　$s_k = \dfrac{3(\bar{x}-median)}{s}$

BASIC PROBABILITY

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 　　　$P(A|B) = \dfrac{P(A \cap B)}{P(B)}$

PROBABILITY DISTRIBUTIONS

$X \sim N(\mu, \sigma^2) \quad \rightarrow \quad Z \sim N(0,1) \; ; \quad Z = \dfrac{X - \mu}{\sigma}$

$\bar{X} \sim N(\mu_{\bar{x}}, \sigma_{\bar{x}}^2) = N\left(\mu, \dfrac{\sigma^2}{n}\right) \quad \rightarrow \quad Z \sim N(0,1) \; ; \quad Z = \dfrac{\bar{X} - \mu}{\sigma/\sqrt{n}}$

$X \sim B(n, p)$ approximates to $X \sim N(\mu, \sigma^2) \rightarrow X \sim N(np, npq) \; ; \; Z = \dfrac{X - np}{\sqrt{npq}}$

HYPOTHESIS TESTING: ONE-SAMPLE TESTS

Z-test: $Z = \dfrac{\bar{X}-\mu}{\sigma/\sqrt{n}}$, σ known 　　t-test: $t = \dfrac{\bar{X}-\mu}{s/\sqrt{n}}$; $df = n - 1$, σ unknown and $n < 30$

Critical values for Z-distribution:

α	Z_α	$z_{\alpha/2}$
0.01	2.3263	2.5758
0.025	1.9600	2.2400
0.05	1.6449	1.9600
0.005	2.5758	2.8100

HYPOTHESIS TESTING: TWO-SAMPLE TESTS

Z-test for two independent samples:

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}}$$

t-test for two independent samples (equal population standard deviations):

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{S_p^2}{n_1} + \dfrac{S_p^2}{n_2}}}$$

$$S_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 - 1) + (n_2 - 1)}$$

t-test for two dependent samples:

$$t = \frac{\bar{d} - d_0}{s_d/\sqrt{n}} \qquad where \qquad s_d = \sqrt{\frac{\sum d^2 - \left(\frac{\sum d}{n}\right)^2}{n - 1}} \quad and \quad \bar{d} = \frac{\sum d_i}{n}$$

ANALYSIS OF VARIANCE (ANOVA)

ANOVA test:

$$SSB = SSTr = \sum \left(\frac{T_c^2}{n_c}\right) - \frac{(\sum X)^2}{n}$$

$$SSTotal = \sum X^2 - \frac{(\sum X)^2}{n}$$

$$SSTotal = SSTr + SSE = SSB + SSW$$

$$MSTr = \frac{SSTr}{k - 1}$$

$$MSE = \frac{SSE}{n - k}$$

$$F = \frac{MSTr}{MSE}$$

CHI-SQUARE ANALYSIS

χ^2-test:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i} \quad with \quad E_i = np_i$$

REGRESSION ANALYSIS

Simple Linear Regression:

$$\hat{y} = a + bx, \quad \text{where} \quad b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2} \quad \text{and} \quad a = \frac{\sum y}{n} - b\frac{\sum x}{n}$$

Pearson Product-Moment Correlation Coefficient:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Coefficient of Determination $= r^2$

INDEX NUMBERS

Simple Price Index:

$$I = \frac{P_t}{P_o} \times 100$$

Simple Aggregate Price Index:

$$I = \frac{\sum P_t}{\sum P_o} \times 100$$

Simple Aggregate Quantity Index:

$$I = \frac{\sum Q_t}{\sum Q_o} \times 100$$

Paasche Price Index:

$$I = \frac{\sum P_t Q_t}{\sum P_o Q_t} \times 100$$

Paasche Quantity Index:

$$I = \frac{\sum Q_t P_t}{\sum Q_o P_t} \times 100$$

Laspeyres Price Index:

$$I = \frac{\sum P_t Q_o}{\sum P_o Q_o} \times 100$$

Laspeyres Quantity Index:

$$I = \frac{\sum Q_t P_o}{\sum Q_o P_o} \times 100$$

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