UNIVERSITI TEKNOLOGI MALAYSIA

SCSI2143 / SCSI2143

Probability & Statistical Data Analysis

2019/2020 – Semester 2

ASSIGNMENT 5

Please submit this assignment in pdf format via your e-learning.

QUESTION 1

(a) A study of zinc-deficient mothers was conducted to determine effects on zinc supplementation during pregnancy. Statistics of sample data are listed in Table 1. The weights were measured in grams. Using a 0.05 significance level, is there sufficient evidence to support the claim that the variation of birth weights for the placebo population is less than the variation for the population treated with zinc supplements?

Table 1

Zinc Supplement Group	Placebo Group
$n_1 = 10$	$n_2 = 15$
$\bar{x}_1 = 3214$	$\bar{x}_2 = 3088$
$s_1 = 669$	$s_2 = 728$

(b) In low-speed crash tests of five cars, the repair costs were computed for a factory authorized repair and an independent repair workshop. The results are listed in Table 2. Is there sufficient evidence to support the claim that the independent workshop has lower repair costs? Use a 0.01 significance level.

Table 2

Car	1	2	3	4	5
Authorized repair center, x_1	RM797	RM571	RM904	RM1147	RM418
Independent workshop, x_2	RM523	RM488	RM875	RM911	RM297
$D = x_1 - x_2$	274	83	29	236	121
$D^2 = (x_1 - x_2)^2$	75076	6889	841	55696	14641

QUESTION 2

(a) During flu outbreak, parents of 2000 babies were surveyed by researchers of a pharmaceutical company to determine if the company's new flu medicine was effective after two days. Among 120 babies who had the flu and were given the medicine, 29 were recovered within two days. Among 280 babies who had the flu but were not given the medicine, 56 recovered within two days. Is there any significant indication that supports the company's claim of the effectiveness of the flu medicine? Use a 0.01 level of significance.

(b) An experiment was conducted to compare alcohol content of a cleaning product on two different production lines. Production was monitored five times a day. The data are shown in Table 3. Assume both populations are normally distributed. It is suspected that production line 1 is not producing as consistently as production line 2 in terms of the alcohol content. Test this claim at significance level 0.05 by assuming that the two population variances were equal.

Table 3

Production line 1:	0.48	0.39	0.42	0.52	0.40
Production line 2:	0.38	0.37	0.39	0.41	0.38

(c) Data in the following Table 4 shows the number of words spelled correctly by 10 participants of an international spelling bee competition before and after training. Is there sufficient evidence to conclude that training can increase the number of words spelled correctly by the participants? Use a 0.05 significance level.

Table 4

Before training	204	393	391	265	326	220	423	342	480	464
After training	223	412	402	285	353	243	443	340	582	490

QUESTION 3

(a) As a part of an industrial training program, some trainees are instructed by Method A, which is straight teaching-machine instruction, and some are instructed by Method B, which also involves the personal attention of an instructor. Random samples of size 10 are taken from large groups of trainees instructed by each of these two methods, and the scores they obtained in an appropriate achievement test are shown in Table 5. Use 0.05 level of significance to test the claim that Method B is more effective. Assume that the populations sampled can be approximated closely with normal distribution having the same variance.

Table 5

Method A	71	75	65	69	73	66	68	71	74	68
Method B	72	77	84	78	69	70	77	73	65	75

(b) In a study of the effectiveness of physical exercise in weight reduction, a group of 12 persons participate in a prescribed program of physical exercise for one month showed in Table 6. Use the 0.01 level of significance to test whether the prescribed program of exercise is effective.

Table 6

Weight before (kg)	95	81	76	96	82	87	71	82	77	83	81	65
Weight after (kg)	89	77	77	94	80	86	72	82	74	81	78	63

QUESTION 4

(a) A marketing study found that the mean spending in 15 categories of consumer items for 150 respondents in the 18 to 34 age group was RM75.50 with a standard deviation of RM53.20. For 250 respondents in the 35+ age group, the mean and the standard deviation were RM65.20 and RM46.10, respectively. Test the hypothesis that there is no difference in the mean spending between these two populations. Use a significance level of 0.05.
(Note: Assume that the population variances are not equal).

(b) In a study of memory recall, ten students from a large statistics and data analysis class were selected at random and given 15 minutes to memorize a list of 20 nonsense words. Each was asked to list as many of the words as he or she could remember both 1 hour and 24 hours later. The data are as shown in Table 1. Is there evidence to suggest the mean number of words recalled after 1 hour exceeds the mean recall after 24 hours by more than 3? Use a significance level of 0.05.

Table 1

Student	1	2	3	4	5	6	7	8	9	10
1 hour later (words)	14	12	18	7	11	9	16	15	13	17
24 hour later (words)	10	4	14	5	8	5	11	12	9	10