Department of Statistics & Operations Research

College of Science

KingSaudUniversity

STAT – 145: Biostatistics

Final Examination

Second Semester 1433 – 1434

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| Student's Name |  |
| Student's Number |  |
| Section's Number |  |
| Teacher's Name |  |

Instructions:

* There are 40 multiple choice questions.
* Time allowed is 180 minutes. (3 Hours).
* For each question, put the code of the correct answer in the following table beneath the question number. Please, use capital letters: A, B, C, and D.
* Do not copy answers from your neighbors; they have different question forms.
* Mobile Telephones are **not allowed** in the classroom.

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
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| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
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| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
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**Question\_1:**

The blood pressure for healthy Saudi women is distributed normally with mean 118 and variance 625. If a random sample of 20 healthy women was taken. Then find

1. The mean of the sample mean ():

(a) 120 (b) 138 (c) 125 (d) 118

* 1. The standard error /nttytutytkhl8j,of the sample mean :

(a) 5.59 (b) 1.25 (c) 31.25 (d) 25.00

1. The probability that the sample mean will be less than 110 is

(a) 0.07636 (b) 0.02275 (c) 0.92364 (d) 0.37448

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**Question\_2:**

If the hemoglobin level of pregnant women is normally distributed, and if it is found in a sample of 25 pregnant women, the mean hemoglobin level was 11 ­­g/dl with standard deviation of 0.5g/dl. Using α = 0.05, test if the average hemoglobin level for the pregnant women is different from 10 g/dl.

1. The hypotheses are :

(a) Ho: μ=10 (b) Ho: μ=10 (c)Ho: μ < 10 (d)Ho: μ = 10

HA: μ10 HA: μ<10 HA: μ>10 HA: μ>10

1. The assumptions are:
2. Normal distribution, n small, σ2 known .
3. Normal distribution, n small, σ2unknown
4. Distribution is unknown, n large, σ2 known .
5. Distribution is unknown, n large, σ2 unknown .
6. The test statistic is:

(a)(b)  (c)(d)

1. The value of the test statistic is:

(a) 0.283 (b) 10 (c)7.07 (d)0.057

1. The decision is

(a)Do not reject (Accept) H0 (b) Reject H0

1. We conclude that
2. The mean hemoglobin level is different from 10.
3. The mean hemoglobin level is smaller than 10.
4. The mean hemoglobin level is equal to 10.
5. The mean hemoglobin level is greater than 10.

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**Question\_3:**

The following table represents the burning times of flavor of two different types. Assuming that the two populations are approximately normally distributed **with equal variances**. Can we conclude that on the basis of the following data, in table below that the mean of burning times of flavor of type two **is greater than** the mean of burning times of flavor type one?. Use α = 0.1

|  |  |  |
| --- | --- | --- |
| Type two | Type one |  |
| 12 | 12 | Sample size |
| 64.4 | 61.2 | Sample Mean |
| 80.4 | 81 | Sample Variance |

1. The alternative hypothesis is:

(a) HA: μ1- μ20 (b) HA: μ1- μ2< 0 (c) HA: μ1- μ2> 0 (d) HA: μ1- μ2 = 0

1. The point estimate of μ1- μ2 is:
2. 2.2 (b) 3.2 (c) -3.2 (d) 0.08
3. The value of the pooled estimate of the variance ($s\_{p}^{2}$) is
4. 73.97 (b) 80.7 (c) 8.98 (d) 88.03
5. The value of the test statistic is:

(a) 0.873 (b) -0.097 (c) 0.097 (d) - 0.873

1. The decision is

(a) Do not reject (Accept) H0 (b) Reject H0

1. A lower limit of 90% confident interval for the difference between the two population means (μ1- μ2) is:
2. -3.8098 (b) -2.5881 (c) – 9.526 (d) - 2.5902

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**Question\_4:**

Consider the following study in which standing and spinal systolic blood pressures were compared. This study was performed on 12 subjects. Their blood pressures were measured in both positions. Assume that blood pressure differences follows a normal distribution.

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| **S.D** | **Mean** | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Subject |
| 10.8 | 143.3 | 150 | 120 | 158 | 149 | 136 | 137 | 160 | 142 | 147 | 140 | 145 | 136 | Spinal**(x)** | Blood pressures (mmHg) |
| 9.49 | 140.8 | 143 | 131 | 151 | 145 | 137 | 128 | 162 | 139 | 141 | 135 | 146 | 132 | Standing**(y)** |
| **5.5** | **2.5** | **7** | **-11** | **7** | **4** | **-1** | **9** | **-2** | **3** | **6** | **5** | **-1** | **4** | ***d*** |  |

**{A}**If one is interesting in constructing 95% confidence interval for the difference between the means ($ μ\_{d}$),

1. The reliability coefficient (Table value) is:

(a)$ t\_{0.95,11}=1.796 $(b) $z\_{0.95}=1.64$ (c) $t\_{0.975,11}=2.201 $(d) $z\_{0.975}=1.96$

1. Our 95% confidence interval for$ μ\_{d}$ is:

(a)(– 0.352, 5.35) (b) (-0.995, 5.995) (c) (-0.611, 5.611) (d) (-2.85, 5.35)

**{B}**:**On the basis of previous data,** can we conclude at 5% level of significance

(α = 0.05) that blood pressures that measured in spinal position is greater than blood pressures that measured in Standing position.

1. The Hypotheses are:

(a) $\begin{matrix} H\_{0}: μ\_{d}=0 \\H\_{A}: μ\_{d}\ne 0\end{matrix}$**(b)** $\begin{matrix}H\_{0}: μ\_{d}\leq 0\\H\_{A}: μ\_{d}>0\end{matrix}$ (c)$\begin{matrix}H\_{0}: μ\_{d}\geq 0\\H\_{A}: μ\_{d}<0\end{matrix}$

1. The test statistic is:

(a) $t=\frac{\overbar{d}}{{s\_{d}^{2}}/{\sqrt{n}}}$(b) $t=\frac{\overbar{d}}{{σ}/{\sqrt{n}}}$ (c)$ z=\frac{\overbar{d}}{{s\_{d}}/{\sqrt{n}}}$**(d)**$ t=\frac{\overbar{d}}{{s\_{d}}/{\sqrt{n}}}$

1. The value of test statistic is:

(a) 2.73 **(b)** 1.57 (c) 0.29 (d) 7.62

1. The decision is:

a) Reject $ H\_{0}$ (b) Do not Reject (Accept) $ H\_{0}$)

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**Question\_5:**

1. Suppose that the percentage of a color blind people in a certain population is 20%. A sample of 50 people is selected from this population. The standard error(s.e) of the sample proportion ( $σ\_{\hat{p}} )$ is:

(a) 0.4 057 (c) 0.0032 (d) 0.16

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**Question\_6:**

In a sample of 80 lung cancer patients, the proportion of survived patients was 0.304. Test if the proportion of survived patient is more than 0.3. Use α = 0.1.

1. The hypotheses are:

 (a) Ho: p$\geq $0.3 (b) Ho: p$\leq $0.3 (c) Ho: p $\geq $ 0. (d) Ho: p $\leq $0.3

 HA: p < 0.3 HA: p > 0.3 HA: p = 0.3 HA: p > 0.304

1. The test statistic can be calculated from

(a) (b)  **(c)** (d) 

1. The value of test statistic is:

(c) 0.078 (d) 1.65 (b) 0.9 (a) 1.96

1. The decision rule is:

(a) Reject Ho if Z > 1.645 (b) RejectHo if T > 1.645

(c)Reject Ho if Z>1.285 (d) Reject Ho if T> 1.960

1. The decision is:

(a) Reject Ho (b) Do not Reject (Accept) Ho

1. The conclusion in words is:

(a) The proportion of survived patient of a normal population is more than 0.3

(b) The proportion of survived patient of a normal population is less than or equal to 0.3

(c) The proportion of survived patient of a normal population is different from 0.3

(d)The proportion of survived patient of a normal population is more than or equal to0.3

1. The correct formula for calculating 80% confidence interval is:

(c)(d)

1. The lower bound of the confidence interval is:

(a) 0.7968 (b) 0.2032 (c) 0.2382 (d) 0.3698

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**Question\_7:**

**{A}**In a study of Alzheimer disease, it is found in a sample of 30 male, 18 have Alzheimer disease and in a sample of 50 female, 22 have the Alzheimer disease. Use

α = 0.05 and find:

1. The sample proportion of the disease for male and female, respectively are:

(a) 0.44, 0.6 (b) 0.1, 0.1 (c) 0.73, 0.36 (d) 0.6, 0.44

1. The point estimate for $P\_{m}-P\_{f}$ :

(a) 0.37 (b) 0.16 (c) 0.3 (d) 0

1. The level of confidence interval for $P\_{m}-P\_{f}$ is:

 (a) 90% (b) 99% (c) 95% (d) 97%

1. We are 95% confident that $P\_{m}-P\_{f}$ lies in :

(a) (1.039, 1.161) (b) (0.135, 0.185) (c) (-0.063, 0.383) (d) (-0.01, 0.340)

**{B}For the same question** :We like to see with level of significant$ α=0.05 $if this study provides sufficient evidence for us to conclude that the proportion of the Alzheimer disease in men is more evidence than proportion of Alzheimer disease in women ($H\_{0}:P\_{m}\leq P\_{f} vs H\_{A}:P\_{m}>P\_{f}$( Then

1. The pooled estimate proportion

(a) 0.5 (b) 0.65 (c) 0.16 (d) 0.44

1. The test statistic equals:

(a) T= 1.76 (b) T= 1.385 (c) Z=1.76 (d) Z= 1.39

1. P-Value[ P(Z > test statistic)] equals:

(a) 0.96080 (b) 0.0392 (c) 0.0784 (d) 0.08226

1. Decision is

(a) Reject$H\_{0}$ and accept $H\_{A}$ (b) Reject$H\_{0}$ and reject $H\_{A}$

 (c) Accept $H\_{0}$ and accept $H\_{A}$ (d) Accept $H\_{0}$and reject $H\_{A}$

1. We conclude that proportion of Alzheimer disease in males is:
2. more than that in females
3. less than that in females
4. less or equal to that in females
5. different than that in females
6. If P-value = 0.03 and α=0.10, then the decision in hypothesis testing is:

(a) Information is not sufficient (غير كافيا) to make a decision.

(b) Accept H0

(c) Reject H0

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End of the questions

جدول Z



