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| **كلية العلوم**  **قسم الإحصاء وبحوث العمليات** | **http://ksu.edu.sa/sites/KSUArabic/Students/FemaleStds/AlmalazCenter/AboutCenter/logo/ksu%20logo.png** | **College of Science**  **Department of Statistics & Operations Research** |

**Final Exam Academic Year 1442-1443 Hijri- First Semester**

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| **معلومات الامتحان Exam Information** | | | | | |
| **اسم المقرر** | **Biostatistics** | | | | **Course name** |
| **رمز المقرر** | **Stat 109** | | | | **Course Code** |
| **تاريخ الامتحان** | **1443-05-22** | | **2021-12-26** | | **Exam Date** |
| **وقت الامتحان** | **01: 00 PM** | | | | **Exam Time** |
| **مدة الامتحان** | **ساعتان** | **2 hours** | | | **Exam Duration** |
| **رقم قاعة الاختبار** |  | | | | **Classroom No.** |
| **اسم استاذ المقرر** |  | | | | **Instructor Name** |
|  | | | | | |
| **معلومات الطالب Student Information** | | | | | |
| **اسم الطالب** |  | | | | **Student’s Name** |
| **الرقم الجامعي** |  | | | | **ID number** |
| **رقم الشعبة** |  | | | | **Section No.** |
| **الرقم التسلسلي** |  | | | | **Serial Number** |
| **تعليمات عامة:** | | | | **General Instructions:** | |
| * عدد صفحات الامتحان  صفحة. (بإستثناء هذه الورقة) * يجب إبقاء الهواتف والساعات الذكية خارج قاعة الامتحان. * سيتم التصحيح من الورقة الخارجية فقط ولن ينظر لورقة الاختبار من الداخل . | | | | * Your Exam consists of  PAGES (except this paper) * Keep your mobile and smart watch out of the classroom. * Only the front page will be corrected. | |

**هذا الجزء خاص بأستاذ المادة *This section is ONLY for instructor***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Course Learning Outcomes (CLOs)** | **Related Question (s)** | **Points** | **Final Score** |
| 1 | Chapter 6 | Q1—Q23, Q30—Q31 |  |  |
| 2 | Chapter 7 | Q1—Q40 |  |
| 3 |  |  |  |
| 4 |  |  |  | 40 |
| 5 |  |  |  |

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

**Question(1 – 6):** Suppose that the weight of women at a large university in a certain population are normally distributed with a standard deviation of . A simple random sample of women was drawn with mean *pound*.

* **We want to find a 95% confidence interval for population mean score µ.**

1. The standard error of is :

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 150 | 1. 20 | 1. 0.8 | 1. 4 |

1. The margin of error is ( at 95% confident level ):

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 1.96 | 1. 1.57 | 1. 7.84 | 1. 6.58 |

1. The 95% confidence interval for µ is:

|  |  |  |  |
| --- | --- | --- | --- |
| 1. (142.16,157.84) | 1. (148.04,151.96) | 1. (144.03,153.98) | 1. (143.4,156.6) |

* **On the basis of the data given above can we conclude that the mean weight of women in the population is not 140 bound? Let .**

1. The value of the test statistic is:

|  |  |  |  |
| --- | --- | --- | --- |
| (A) 12.5 | (B) 2.5 | (C) 0.5 | (D) 0.625 |

1. The rejection region is :

|  |  |
| --- | --- |
| 1. ( | 1. ( |
| 1. ( | 1. ( |

1. The decision is:

|  |  |
| --- | --- |
| 1. Accept | 1. Reject |

**Question (7 – 12):** The tear strengths are measured in a sample of 14 sheets of silicone rubber. The mean and standard deviation of tear strength of this sample are 33.712 and 0.798 respectively. Assuming a normal population, then,

1. The point estimate of is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.213 | 1. 14 | (C) 33.712 | (D) 0.798 |

* **To find the 90% confident interval of ,**

1. The reliability coefficient is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 1.350 | 1. 1.771 | 1. 1.645 | 1. 1.761 |

1. The lower limit of CI of is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 34.09 | 1. 33.42 | (C) 32.30 | (D) 33.33 |

* **Test whether the mean tear strength exceeds 33 at level of significance .**

1. The hypotheses are

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

1. The test statistic is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.89 | 1. 3.34 | 1. 15.82 | 1. - 3.34 |

1. The decision is

|  |  |
| --- | --- |
| 1. Reject | 1. Accept |

**Question (13 – 17 ):** Suppose a random sample of high school students is selected to determine how long male and female students sleep at night. Both populations have a normal distribution

|  |  |  |  |
| --- | --- | --- | --- |
| **Group** | ***n*** | **Sample mean hours of sleep** |  |
| **Males** | 13 | 6 | 2.3 |
| **Females** | 10 | 7.5 | 3.9 |

1. The standard error of is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 1.3885 | 1. 0.7529 | 1. -1.5 | 1. 1.4757 |

1. The upper limit of the 95% confidence interval for is :

|  |  |  |  |
| --- | --- | --- | --- |
| 1. - 2.9757 | 1. 2.9757 | 1. 0.0243 | 1. - 0.0243 |

* **Test the average sleep hours for males less than the average sleep hours for females? α = 0.05**

1. The value of the test statistic is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. -1.992 | 1. -1.0803 | 1. 1.0803 | 1. 1.992 |

1. The Acceptance Region of (A.R. of ) is:

|  |  |  |  |
| --- | --- | --- | --- |
| 1. (-∞ , -1.645) | 1. (-1.96, ∞) | 1. (-1.96,1.96) | 1. (-1.645, ∞) |

1. The decision is to:

|  |  |
| --- | --- |
| 1. Reject | 1. Accept |

**Question (18 – 23 ):** The data in table was collected from a sample of **47** infants in Providence, Rhode Island, at 1 month of age. In this study a research nurse visited the home of each child and took their blood pressure using a special apparatus for measuring infant (**BP**). She also noted whether the infant was sleep or awake and whether or not the child was agitated when the **BP** was taken. The two populations distributed normally with equal variances.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Sleep status** | **Mean BP** | **Sample Standard deviation** | **n** |
| **1** | **Quiet sleep** | 81.9 | 9.8 | 20 |
| **2** | **Awake and quiet** | 86.1 | 10.3 | 27 |

* **Do these data provide sufficient evidence to indicate a difference among the population means at ?**

1. The alternative hypothesis is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

1. The point estimate of is:

|  |  |  |  |
| --- | --- | --- | --- |
| 1. -1.5 | 1. - 4.2 | 1. 0.5 | 1. 4.2 |

1. The pooled estimate of the commend variance is:

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 106.338 | 1. 101.847 | 1. 9.659 | 1. 10.089 |

1. The appropriate test statistic is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

1. The 95% C.I for the difference between the mean of BP for quiet sleep infants and mean of BP

for awake infants is:

|  |  |  |  |
| --- | --- | --- | --- |
| 1. (-10.03, 1.64) | 1. (-6.08, 2.31) | 1. (10.29,12.89) | 1. (-10.197,1.797) |

1. Based on the 95% C.I in the above question, it can be concluded that

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | 1. None of these |

**Question (24 - 25):**

1. Type II error is

|  |  |
| --- | --- |
| 1. Accepting H0 when H0 is false | 1. *P*( Accepting H0 | H0 is false) |
| 1. Rejecting H0 when H0 is true | 1. *P*( Rejecting H0 | H0 is true) |

1. Suppose the P-value for a hypothesis test is 0.0304. Using α = 0.05, what is your decision?

|  |  |
| --- | --- |
| 1. Reject | 1. Accept |

**Question (26 - 29):** The cholesterol levels of 11 people before (X) and after (Y) using a certain medicine are given in the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **People** | **Xi** | **Yi** | **Di = Xi -Yi** |
| 1 | 318 | 296 | 22 |
| 2 | 287 | 268 | 19 |
| 3 | 275 | 270 | 5 |
| 4 | 275 | 265 | 10 |
| 5 | 285 | 276 | 9 |
| 6 | 284 | 269 | 15 |
| 7 | 307 | 291 | 16 |
| 8 | 291 | 277 | 14 |
| 9 | 283 | 263 | 20 |
| 10 | 285 | 262 | 23 |
| 11 | 307 | 292 | 15 |

* **Assume normal distribution for the differences. The value of standard deviation of the difference Test the effectiveness of the medicine at α =0.05 as a level of significance : versus : .**

1. The sample mean of the differences *D*  is:

|  |  |  |  |
| --- | --- | --- | --- |
| = 15.273 | = 16.8 |  | = |

1. The value of the test statistic is:

|  |  |  |  |
| --- | --- | --- | --- |
| (A) *Z* = 8.59 | (B) *T* = 8.59 | (C) *T* = 9.01 | (D) *Z* = 9.01 |

1. The decision is:

|  |  |
| --- | --- |
| 1. Accept | 1. Reject |

1. The lower limit of 90 % confident interval for µD is:

|  |  |  |  |
| --- | --- | --- | --- |
| (A) 12.33 | (B) 18.345 | (C) 12.201 | (D) 11.075 |

**Question (30 – 35 ):** In order to study the smokes in a primary school, it was found that the number of students who smokes is 25 out of 300.

1. A point estimate of population proportion *p* is :

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.061 | 1. 0.083 | 1. 0.25 | 1. 0.05 |

1. The 95% confidence interval of *p* is :

|  |  |  |  |
| --- | --- | --- | --- |
| 1. (0.01 , 0.82) | 1. (0.057 , 0.109) | 1. (0.012 , 0.31) | 1. (0.052 , 0.114) |

* **We want to test against, using the 0.05 level of significance.**

1. The critical value is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 1.645 | 1. 1.96 | 1. 1.711 | 1. -1.645 |

1. The value of the test statistic is :

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 2.252 | 1. 0.882 | 1. 0.816 | 1. 5.634 |

1. Reject if :

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

1. The Decision is :

|  |  |
| --- | --- |
| 1. Reject | 1. Accept |

**Question (36 – 40 ):** In a study on the prevalence of asthma (مرض الربو) among Saudi school children age from 7 to 12, two independent samples were taken from wheezy children and non- wheezy children. It was determined whether or not the child’s father has/had asthma. The results shown in the following table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Population** | | **Father with asthma** | | |
| Yes | No | Total |
| 1 | **wheezy children** | 130 | 189 | 319 |
| 2 | **non-wheezy children** | 234 | 2488 | 2722 |

* **Can we conclude that the proportion of wheezy children whose father has/had asthma (Yes) is more than this proportion for non-wheezy children with α =0.01 as a level of significance?** Assume equal proportion.

1. The point estimate of for children whose father has/had asthma is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 0.086 | 1. 0.156 | 1. 0.408 | 1. 0.322 | 1. - 0.322 |

1. The null hypothesis is

|  |  |  |  |
| --- | --- | --- | --- |
| (A) |  |  |  |

1. The pooled estimate of the common proportion () is:

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.119 | 1. 0.085 | 1. 0.880 | 1. 0.322 |

1. The value of the test statistic is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 16.76 | 1. 12.67 | 1. 11.49 | 1. 15.21 |

1. The decision is to

|  |  |
| --- | --- |
| (A) Reject | (B) Accept |





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