Medical Statistics 2nd Semester Take Home Final Exam

Due Date: Dec 19 2022 (13:00) to Dec 22 2022 (23:59)

Name: _____

Notice

- Please DO SOLVE ANSWERS BY YOURSELVES!!
- You can use materials from other textbooks, lecture notes, and websites but you have to cite materials in every answer.
- Write down your answers to each question in this document file (make a space for answers below the question)

Questions

1. Which one of the following statements is False?

    a. The probability of a type II error is the probability that you reject the null hypothesis when it is true. then are followed to document occurrence of disease.

    b. Subjects are enrolled or grouped on the basis of their exposure, then are followed to document occurrence of disease in prospective cohort study.

    c. Especially when more than 20% of cells have expected frequencies < 5, we need to use Fisher's exact test to determine if there are associations between two categorical variables.

    d. To use the two-sample t-test, we need to assume that the data from both samples are normally distributed and they have the same variances.

    e. In test for heterogeneity of meta-analysis, if Higgins I2<=25%, studies are regarded homogeneous and the fixed effect model of meta-analysis can generally be used.bles.

2. There are five urns, and they are numbered 1 to 5. Each urn contains 10 balls. Urn i has i defective balls and $10 - i$ non-defective balls, $i = 1, 2, \ldots, 5$. For example, urn 3 has three defective balls and seven non-defective balls. Consider the following random experiment: First an urn is selected at random, and then a ball is selected at random from the selected urn. Suppose that the experimenter does not know which urn was selected. Let's ask two questions.

    a) What is the probability that a defective ball will be selected?

b) If we have already selected the ball and noted that it is defecvive, what is the probability that it came from urn 5?

3. The Census Bureau gives this distribution for the number of people in American Households:

Household size:	1	2	3	4	5	6	7
Proportion	0.264	0.332	0.162	0.145	0.063	0.022	0.013

4.

5.

6. A total of 160 men of different ethnic backgrounds were included in a cross-sectional study of factors related to blood clotting. We compared mean platelet levels in the four groups using a one-way ANOVA. It was reasonable to assume Normality and constant variance.

Group	N (%)	Mean($\times 10^9$)	SD ($\times 10^9$)
Caucasian	100 (62.5)	268.1	77.08
Afro-Caribbean	18 (11.3)	254.3	67.50
Mediterranean	23 (14.4)	281.1	71.09
Other	19 (11.9)	273.3	63.42

Fill the following ANOVA table

Source	SS	DF	MS	F-ratio	P-value
Between Group	9333.0	(1)	(3)	(5)	0.423
Within Group	966108.0	(2)	(4)		
Total	975441.0				

8. Calculate the sample size for the following questions.

a) An active-controlled randomized trial proposes to assess the effectiveness of Herbal medicine A in reducing pain. A previous study showed that Herbal medicine A can reduce pain score by 5 points from baseline to week 24 with a standard deviation (σ) of 1.195. A clinically important difference of 0.5 as compared to active drug is considered to be acceptable. (Level of significance = 5%, Power = 80%, Type of test =two-sided)

b) A placebo-controlled randomized trial proposes to assess the effectiveness of Drug A in curing infants suffering from sepsis. A previous study showed that proportion of subjects cured by Drug A is 50% and a clinically important difference of 16% as compared to placebo is acceptable. (Level of significance = 5%, Power = 80%, Type of test =two-sided)