

Assignment

SOLVE QUESTIONS USING R STUDIO

Question 1

In a study of the treatment of hot flushes associated with menopause, 13 menopausal women were treated for six months with evening primrose oil. The number of hot flushes was recorded daily for one month before the treatment and for the last month of treatment. The results for the mean daily number of hot flushes for each woman for the month before and during the last month of treatment are given below. Perform a distribution-free test on these data and interpret the results, including your conclusion on the efficacy of the treatment.

Mean daily number of hot flushes Subject	Before treatment	After treatment
1	6.9	7.1
2	6.9	6.2
3	6.6	8.0
4	12.9	11.9
5	6.8	6.1
6	8.0	7.7
7	7.2	7.8
8	6.0	3.7
9	10.1	10.4
10	6.3	6.3
11	5.7	3.6
12	8.1	10.9
13	7.6	2.7

Question 2

A clinical trial examined the effectiveness of aspirin in the treatment of cerebral ischaemia. Patients were randomised into treatment and control groups. The study was double blind in the sense that neither patients nor doctors knew which patients took aspirin and which placebo. After 6 months of treatment the doctor evaluated each patient's progress. Of the 87 patients in the aspirin group, 73 had favourable outcomes while 53 of the 77 control patients had favourable outcomes.

Compare the proportions of patients having favourable outcomes. Does aspirin have a significant beneficial effect?

Question 3

An anti-smoking campaign is to be evaluated by determining the smoking habits of a random sample before the campaign, and of a different random sample after the campaign.

- a) It is expected that 40% of the population will be smokers before the campaign. The study is to be designed to detect a reduction to 35%, with a power of 80% using a two-sided 5% significance test. How many subjects are required in each random sample?
- b) For financial reasons it is only possible to have a sample size of 1200 in each sample. What would the power be?

Question 4

A study is being planned to investigate the association between blood pressure and occupation. Two occupations (doctors and veterinarians) are to be compared. From previous work the standard deviation between individuals in blood pressure is expected to be about 10 mmHg.

- a) In your own words explain what the statistician means by the term 'power' using the question's example.
- b) A sample size is required to detect a mean difference between the groups of 5 mmHg with a power of 80% by a two-sided 5% significance test. How many people should be included in each group?
- c) How much does the group size increase if the researcher required a power of 90%?

Question 5

In a study of management of scours (acute diarrhoea) in calves sick animals were treated with an oral solution. The calves were randomly allocated to receive a solution that contained carbohydrate or one that did not. The calves were then monitored and their blood glucose (mmol/L) was monitored, given the following results on the first day of treatment:

	Carbohydrate (n=12)		No carbohydrate (n=20)	
	Mean	Standard deviation	Mean	Standard deviation
At start	11.3	6.77	13.4	6.41
After 12 hours	12.6	5.82	11.3	4.49
Change (“after 12 hours” – “at start”)	1.23	5.27	-2.07	6.30

Analyse these data fully to compare the change in blood glucose concentration in the two groups of calves. Write a brief report summarising your results and stating your conclusions.

