



Test 2 – SAMPLE

IPDA1005 Introduction to Probability and Data Analysis

Date and Time:

NAME & ID: _____ .

Question:	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	Total
Points:												
Points possible	2	3	2	2	2	2	10	5	5	9	8	50

Instructions to Candidates:

1. THIS IS A 100 MINUTES EXAM,
2. IT IS DIVIDED INTO TWO PARTS
 - (a) PART A CONSISTS OF MULTIPLE-CHOICE/SHORT ANSWER/FILL-IN-THE-GAP QUESTIONS, STUDENTS DO NOT NEED TO SHOW WORKING;
 - (b) PART B CONSISTS IF SHORT ANSWER QUESTIONS AND STUDENTS **MUST** SHOW WORKING;
3. STUDENTS ARE ALLOWED TO:
 - (a) USE ANY MATERIAL IN THIS UNIT FROM MOODLE. (DO NOT SEARCH WEBSITES OR COMMUNICATE WITH OTHERS)
 - (b) BRING FOUR PAGES OF 2-SIDED A4 PAGE FORMULA (OR CHEAT SHEET) FOR THIS EXAM;
 - (c) USE R AND/OR A SCIENTIFIC CALCULATOR
 - (d) USE STATISTICAL TABLES.

PART A

A1 Complete the following sentence about types of variables:

_____ variables have numerical values that indicate some characteristic of each unit. They can either be continuous or _____. Categorical variables place units into a category and can be _____ or Ordinal. [2 points]

A2 Let a random sample of values be as follows: 44.0, 79.6, 70.6, 82.7, 61.8, 50.7, 47.1, 60.9, 70.5, 67.9, 47.2, 62.3, 70.1, 58.5, 43.7.

Compute the mean, Q_1 , and Q_3 [3 points]

(i) $\bar{X} =$

(ii) $Q_1 =$

(iii) $Q_3 =$

A3 What is the sample size required if we need to estimate a population proportion p such that a 90% confidence interval has margin of error no more than 0.15? [2 point]

(A) 15.

(B) 30.

(C) 50.

(D) None of the above.

A4 By-election Voter records show that about **15%** of the voters in an electorate where a by-election is to be held are registered members of the Liberal Party, whereas only **10%** are registered members of the Labor Party. To test out a new sampling scheme, you carry out a random survey of 250 people; of the people you contact, **17%** say that they're members of the Liberal Party. Is each of the boldface numbers a parameter or a statistic? Why? [2 points]

PART B

- B1 The following is the hours of sleep 6 patients had before and after taking a sleep inducing drug. Construct a 95% confidence interval for the mean increase in sleeping hours. [10 point]

Patient	1	2	3	4	5	6
Before	5	4	6	5.5	6	6.5
After	6.5	4.5	5	6	7.5	4

B2 A sample of size 36 was taken from a population and the sample mean and the sample variance obtained were $\bar{x} = 19.9$ and $s^2 = 32.8329$. Construct a 90% confidence interval for the population mean. [5 point]

B3 Sample proportions obtained from two independent samples of size 25 and 36 were 0.32 and 0.25 respectively. Construct a 95% confidence interval for the difference of proportions. [5 point]

B4 In a random sample of 120 parts, 18 are found to be defective. At the 1% level of significance, do the data indicate that the defect rate in parts from this plant exceeds 10% using the p-value method. Clearly state your conclusion. [9 point]

B5 It is thought that 40% of the adult population are coffee drinkers. A random sample of size 240 contained 80 coffee drinkers. Test the hypothesis that the proportion of adult population are coffee drinkers is 40%. Use a $\alpha = 0.01$.

(i) What is the standard deviation of \hat{p} . [2 point]

(ii) What is the approximate distribution of \hat{p} ? [3 point]

(iii) What is the probability that \hat{p} is between 87% and 93%? (This is the probability that \hat{p} estimates p within 3%). [3 points]