Maths & Stats Pre-Sessional Tutorial

Exercises for Revision

Exercise 1

Suppose a study of speeding violations and drivers who use cell phones produced the following data:

	Speeding violation in the last year	No speeding violation in the last year	Total
Cell phone user	25	280	305
Not a cell phone user	45	405	450
Total	70	685	755

Calculate the following probabilities using the table.

a) Find the probability that a person is a cell phone user.
b) Find the probability that a person had no violation in the last year.
c) Find the probability that a person had no violation in the last year and was a cell phone user.
d) Find the probability that a person is a cell phone user or person had no violation in the last year.
e) Find the probability that a person is a cell phone user given person had a violation in the last year.
f) Find the probability that a person had no violation last year given person was not a cell phone user.

Exercise 2

How much money does a typical customer spend on a visit to a supermarket? The amount expressed in £ has a normal distribution with mean £40 and a standard deviation £13.

a) Calculate the probability that the customer will spend less than £45.
b) Calculate the probability that the customer will spend at least£10 but at most £60.

c) Interest is in the 10% of the customer who spend the largest amounts of money. How much money does a customer have to spend to belong to that group?
d) Determine the maximum of the amounts spent by 97.5% of the customer.

Exercise 3

Suppose that a random variable X is normally distributed with mean 10 and variance 4.

a) Determine a such that P(X > a) = 80%.
b) Determine b such that P(X < b) = 14%.
c) Determine c such that P(-c < X < c) = 40%.

Exercise 4

State the null and alternative hypotheses for each of the following situations. (That is, identify the correct number μ_0 and write $H_0: \mu = \mu_0$ and the appropriate expression for H_1.)

a) The average time workers spent commuting to work in Verona five years ago was 38.2 minutes. The Verona Chamber of Commerce asserts that the average is less now.
b) The mean salary for all men in a certain profession is $58,291. A special interest group thinks that the mean salary for women in the same profession is different.
c) The accepted figure for the caffeine content of an 8-ounce cup of coffee is 133mg. A dietitian believes that the average for coffee served in local restaurants is higher.
d) The average yield per acre for all types of corn in a recent year was 161.9 bushels. An economist believes that the average yield per acre is different this year.
e) An industry association asserts that the average age of all self-described fly fishermen is 42.8 years. A sociologist suspects that it is higher.

Exercise 5

The mean household income in a region served by a chain of clothing stores is £48,750. In a sample of 40 customers taken at various stores the mean income of the customers was £51,505. The population standard deviation is £6,852.

a) Test at the 10% level of significance the null hypothesis that the mean household income of customers of the chain is £48,750 against that alternative that it is different from £48,750.
b) The sample mean is greater than £48,750, suggesting that the actual mean of people who patronize this store is greater than £48,750. Perform this test, also at the 10% level of significance.

Exercise 6

An office water cooler is said by the manufacturers to dispense an average of 250ml of water each use with a population standard deviation of 5ml. Jordan suspects the manufacturer's claim is too high, and observes the following amounts dispensed over five uses during a day:

240ml, 235ml, 250ml, 245ml, 230ml

Test the manufacturer's claim at the 5% level.