NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF LANDSCAPE ARCHITECTURE AND URBAN DESIGN

BSc HONOURS IN PROPERTY DEVELOPMENT AND ESTATE MANAGEMENT

AQS 2109: STATISTICS I

MAY 2015 SUPPLIMENTARY EXAMINATION

Time: 3 hours

Candidates should answer **ONLY FOUR** questions (25 marks each).
Statistical Tables are provided; however, Statistical Tables should not be marked or taken out
of the examination room.

A1.
(a)   A discrete probability distribution function is given below:

X	1	a	2a	4
P(X=x)	0.1	0.4	0.2	0.3

   (i)   Find a   [2]
   (ii)   Find E[X]   [3]
   (iii)   Find var[X]   [3]

(b)   The time (in minutes) until the next customer enter into a property firm follows a
uniform distribution with $f(x) = \dfrac{1}{10}$ where x goes from 0 to 10 minutes.

   (i) Find E[X]   [3]
   (ii) Find var[X]   [5]
   (iii)Find the probability that the time is greater than 20   [3]

(c) With reference to examples, compare discrete and continuous distributions   [6]

A2. (a) Discuss the properties of probabilities of events.   [5]

(b) The following table shows information about the complaints received by two property
management firms; one in Harare and the other in Bulawayo, for valuations done in 2012.

	Complaints in Harare	Complaints in Bulawayo
Sample Mean	20	14
Standard deviation	1.5	2
Sample size	9	10

(i) Assuming population variances are not known, test at 5% level of significance if there is any difference in the complaints between the property management firms. [10]

(ii) Construct a 95% confidence interval of the means for complaints launched in Harare as well as Bulawayo. [10]

A3. a) Five percent of the property sales transactions at a real estate company end up in courts due to customers failing to own up the deal. Find the probability that out of 10 transactions,

  (i) Exactly 7 end up in courts. [2]
  (ii) At least 3 will end up in courts. [5]
  (iii) At most 8 transactions end up in courts. [4]
  (iv) Find the mean and variance of transactions that are done without being settled in courts from a sample of 250. [4]

  b) 3 % of the calls at the reception for a property management firm results in a successful business deal.

  (i) What are the conditions for binomial approximation to normal distribution? [4]
  (ii) What is the chance that in a random sample of 300 calls, less than 30 will result in a successful business deal? [6]

A4. (a) Business investors in the property management market researched on renovations of properties in the city of Bulawayo in 2010 and found out the information given in the table below about renovations and ownership of properties.

Type of ownership	Renovated in the last 5 Years	Renovated in the last 2 Years	Total
Real Estate Agency	75	36	111
Individual	47	89	136
Total	122	125	247

(i) Find the probability that a property renovated in the last 5 years belongs to a Real Estate Agency. [2]
(ii) Find the probability that a property owned by an individual was renovated in the past two years. [2]
(iii) Compute the probability of a property being renovated in the past five years given owned by an individual. [2]
(iv) With the aid of examples describe the classical probability approach [5]

(b) Three workers in a construction industry Anna, Barbra and Cathy pack some window panes in the company's warehouse. Anna packs 55%, Barbra 30% and Cathy 15%. The probability that Anna breaks some window panes is 0.7 and the respective probabilities for Barbra and Cathy are 0.2 and 0.1 respectively. Compute the probability that a pack with broken window panes found by the quality assurance inspector was packed by Anna. [8]

(c) At a property management firm, the warehouse contains 10 doors, 9 of which are old and defective. Suppose that a door is selected at random without replacement for renovations purposes. The selection is done 5 times. Find the probability that a defective door is selected:

(i) 2 times [2]
(ii) 2 or 3 times [2]
(iii) At least once [2]

A5. (a) Discuss the properties of a standard normal distribution [5]

(b) The mean weight of packed driveway pavers is 120kg and the standard deviation is 12kg. Assuming the weights are normally distributed what proportion of the packs weigh:

(i) Between 130 and 155kg. [5]
(ii) More than 170kg [5]
(iii) Less than 120kg [5]
(iv) From a proportion of 300 packs of the pavers, how many packs have a weight between 150 and 180kb [5]