KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE AND SCIENCE INECONOMICS AND MATHEMATICS

COURSE CODE: **BMGT 210**

COURSE TITLE: **BUSINESS STATISTICS I/PROBABILITY & STATISTICS**

STREAM: **Y2S1**

DAY: **FRIDAY**

TIME: **3.00 – 5.00 P.M**

DATE: **13/08/2010**

INSTRUCTIONS:

1. **Answer question ONE and any other TWO questions**
2. **Show all your working and be neat**

PLEASE TURNOVER

Question ONE (30 MARKS)

a) Outline research procedures cycle one has to follow as taught in this course **(5 marks)**

b) Define condition probability of two events, A and B. **(2 marks)**

c) Prove that if A and B are mutually independent events then the following result is true. $P(A \cap B) = P(A).P(B)$ **(3 marks)**

d) In an experiment of rolling two fair dice a player win if s/he turns up a sum of six before a seven in successive rolls. What is the probability s/he will win? **(5 marks)**

1^{st} Die	Possible outcomes					
6	(1,6)	(2,6)	(3,6)	(4,6)	(5,6)	(6,6)
5	(1,5)	(2,5)	(3,5)	(4,5)	(5,5)	(6,5)
4	(1,4)	(2,4)	(3,4)	(4,4)	(5,4)	(6,4)
3	(1,3)	(2,3)	(3,3)	(4,3)	(5,3)	(6,3)
2	(1,2)	(2,2)	(3,2)	(4,2)	(5,2)	(6,2)
1	(1,1)	(2,1)	(3,1)	(4,1)	(5,1)	(6,1)
	1	2	3	4	5	6
	2^{nd} Die					

Figure 1. Two die-experiments

e) The following two events A and B are defined as:
Event A: the sum of scores is more than 7; Event B: One score is more than five
i) Determine P(A and B)
ii) Are the two events independent **(5 marks)**

f) A ball is drawn at random from a box containing 5 red balls, 6 white balls, and 4 blue balls. Determine the probability that the ball drawn is (i) red, ii) white, iii) blue, iv) not red, and v) red or white **(5 marks)**

g) Three balls are drawn successively from the box in (f). Find the probability that they are drawn in the order red, white, and blue if each ball is (i) replaced and (ii) not replaced. **(5 marks)**

Question TWO (20 MARKS)

The data shows the frequency distribution of reported taxable incomes in Kenya

Class limits (x 1000K£)	Frequency (f_i)
0-2	250
2-4	1589
4-6	1768
6-8	1473
8-10	1172
10-15	1298
15-20	306
20-50	200
50-100	21
100-200	3
>200	0
	$\sum f_i$=8080

a) Draw a histogram of the distribution of reported taxable income K£ 50,000. **(5 marks)**
b) Construct percent cumulative distribution. **(3 marks)**
c) Draw the cumulative polygon up to incomes of K£ 20,000. **(2 marks)**
d) From this, estimate (i) the percent of incomes less than K£ 5,000 (ii) the percent greater than K£ 12,000 (iii) the median income (income exceeded by 50% of the population) (iv) the income exceeded in only 10% of the returns. **(5 marks)**
e) Estimate from the polygon the percent of returns reporting taxable incomes between K£7,500 and K£ 17,500. **(5 marks)**

Question THREE (20 MARKS)

a) Define trimmed mean, geometric mean, arithmetic mean and harmonic mean. **(4 marks)**
b) Find the trimmed mean (after dropping one extreme value on either side), geometric mean (using logarithm approach) and arithmetic mean of the following numbers 3, 5, 6, 6, 7, 10, and 12. Assume the numbers are exact. Discuss their differences. **(6 marks)**
c) In assessing the inflation rate in two towns in Kenya using cereals and protein food; the ratio of cereals to protein was 4.00 in June 2009 and in June 2010 ratio is 2.50. What is the average ratio of protein to cereals in the two periods? What suitable average should one use between arithmetic mean or geometric mean when handling ratios? Explain your result. **(5 marks)**

d) Link the formulae below to show a formula for sample variance, sample standard deviation, coefficient of variation and standard error of difference. Hence calculate the sample mean, variance, standard deviation, coefficient of variation, standard error of difference and a construct a 95% confidence interval of the mean (assume t-value at appropriate df= 2.45) **(5marks)**

$$\sum_{i=1}^{7} x_i = 12.6\,,\ \sum_{i=1}^{7} x_i^2 = 23.80\,,\ n=7$$

Question FOUR (20 MARKS)

a) When binomial distribution estimated to poisson distribution? **(2 marks)**

b) Define a multinomial distribution **(2 marks)**

c) Find (i) E(X), (ii) E(X^2) and E(X- $\overline{X}$)^2 for the probability distribution shown below **(3 marks)**

X	8	12	16	20	24
P(X)	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{12}$

d) What is the probability of getting exactly 2 heads in 6 tosses of a fair coin? (Hint: assume binomial distribution) **(3 marks)**

e) What is the probability of getting at least 4 heads in 6 tosses of a fair coin? **(3 marks)**

f) On the final exam in maths the mean was 66 and standard deviation was 12. Determine the standard scores of students receiving the grades i) 59, (ii) 66 and (iii) 88 **(3 marks)**

g) Find the new grades after standardizing the scores for the students in (f) **(4 marks)**

Question FIVE (20 MARKS)

a) Find the probability of boys and girls in families with three children, assuming equal probabilities for boys and girls **(10 marks)**

b) A continuous random variable X having values only between 0 and 5 has a density function given by p(X)=1/2-bX, where b is a constant

(i) Calculate b

(ii) Find Pr {1<X<2} **(10 marks)**