KENYA METHODIST UNIVERSITY

END OF 1ST TRIMESTER 2009 EXAMINATIONS

FACULTY	:	ARTS AND SCIENCES
DEPARTMENT	:	COMPUTER INFORMATION SYSTEMS
UNIT CODE	:	MATH 231
UNIT TITLE	:	BIOSTATISTICS
TIME	:	2 HOURS

Instructions:

- *Answer question ONE and any other TWO questions.*

Question 1 (30 marks)

a) The following data are the results of an experiment to measure the percentage of weight gain for young laboratory mice given a standard diet and mice given 2000ppm nitrate in their drinking water.

Nitrate	12.7	19.3	20.5	10.5	14.0	10.8	16.6	14.0	17.2
Control	18.2	32.9	10.0	14.3	16.2	27.6	15.7		

Test whether the data indicate at level 1% that heavy dose of nitrate retards true mean percentage weight gain in mice. (8 mks)

b) The distribution below shows the heights of patients chosen at random seeking medical services from a health centre.

Height, cm	151-155	156-160	161-165	166-170	171-175	176-180	181-185
No. of Patients	4	7	18	30	23	10	8

i) Construct the histogram and ogive for the data.
ii) Using the diagrams above, estimate median and mode. (7 mks)

c) Among the females in Kenya aged between 18-74 years, diastolic blood pressure is normally distributed with mean 77mmHg and standard deviation 11.6mmHg.

i) Calculate the probability that a woman chosen at random has diastolic blood pressure between 80mmHg and 95mmHg.

ii) Find the diastolic pressure for which 7% this women exceed. (7 mks)

d) A survey of hospitals by the commission on cancer produced the data which classifies women with liver tumors into six classes. The women are classified according to whether they used oral contraceptives and according to type of liver tumor.

	Type of tumor	
	Benign	***Malignant***
Contraceptive users	138	49
Non users	39	41
Use not known	35	76

Do the data provide sufficient evidence to indicate a dependence between type of tumor and use of oral contraceptives? Use $\alpha = 0.05$ (8 mks)

Question 2 (20 marks)

a) Explain the following terms:
   i) Specificity
   ii) Sensitivity
   iii) Survival analysis (6 mks)

b) A day care centre management was interested in obtaining information about the children under their care. For the purposes of planning. One aspect of importance was the weight of children at the centre and the weights of a random sample of children at gave the centre gave the following results.

Weight (lb)	10-19	20-29	30-19	40-49	50-59	60-69	70-79
No. of Children	5	19	10	13	4	4	2

Calculate the following for the data.
   i) Mean
   ii) Variance
   iii) Median
   iv) Coefficient of variation (14 mks)

Question 3 (20 marks)

a) The data below represent the percentage saturation of bile for male patients.

40	86	111	86	106	66	123	90	112	52	88
137	88	88	65	79	87	56	110	78	80	47
74	58	88	73	118	67	57				

Construct a 95% confidence interval for:
i) True mean
ii) True variance (8 mks)

b) The data below give the values of the birth weight, x and the increase in weight between 70 and 100 days of life expressed as a percentage of the birth weight, y.

X	112	111	107	119	92	80	81	84	118	106	103	94
Y	63	66	72	52	75	118	120	114	42	72	90	91

The following are the summaries from the data:

$\sum x=1207$ $\sum y=975$ $\sum xy=94, 322$ $\sum x^2=123, 561$ $\sum y^2=86, 487$

i) Fit the least squares linear regression equation to the data.
ii) Test whether birth weight, x contributes information towards the prediction of the percentage weight increase, y at 99% confidence. (12 mks)

Question 4 (20 marks)

a) A study was carried out to investigate the effects of carbon monoxide on individuals with coronary artery disease. The FEY distribution of patients associated with each of the three medical centers make up district populations. The data are shown below?

	Sample size	*Sample mean*	*Sample SD*
Imenti North	21	2.63	0.496
Meru Central	16	3.03	0.523
Imenti South	23	2.88	0.498

At the 0.05 level of significance, test whether FEV for the three populations are different. (10 mks)

b) Explain the following terms:
i) Relative risk
ii) Odds ratio
iii) Mortality rate
iv) Morbidity rate
v) Sampling (10 mks)