Section III: LONG ANSWER QUESTIONS (Answer Any TWO Questions in this section)

2. In a clinical trial involving 4,396 patients aged 65-74 whose systolic pressure was between 160 and 209 mmHg and whose diastolic pressure was less than 115 mmHg, patients were randomly assigned to initial therapy with a diuretic or a beta-blocker or a matched placebo, and then followed up for an average of 5.8 years. The main objective was to see if a policy of anti-hypertensive treatment reduces the risk of stroke, coronary heart disease and death. The main results are as follows:

	Active treatme	nt 🗸	
Salar Dente In	Diuretic *	Beta-blocker	Pleaste )
No. of patients	1081	1102	- Placebo 😽 .
Strokes	45	56	2213
Coronary events	48	80	134
Deaths		00	159
Deaths	134 /	167	315 /

Using confidence intervals in both cases, is there significant evidence for there being differences in the risk of:

(a) Death between those taking diuretic and those taking placebo? (10 marks)

(b) Stroke between those taking beta-blocker and those taking placebo? (10 marks)

In an anthropometric study to assess the nutritional status of school-going children in a rural standard deviation of 4.5. Accept these values as population parameters and that weight is normally distributed.

(a) What is the probability that a given 10-year old child in the community will have a weight greater than 24 kg?

(b) What is the probability that the average weight of 48 10-year olds will lie between 25 and 27 kg?  $Z_2 25-25.7$  pullo

(c) What introbuting weight do 10 year-olds in the community need to have to be in the top . 10% of the children by weight?

Amoore DE	0.38 = 0.3520;
Zacone DE	3.29 = 0.0005;
Z-spars of	1.08 = 0.1401;
Encore Of	1.285 = 0.10

 $Z_{\text{score}}$  of 1.96 = 0.025;

## LEVEL IV: BIOSTATISTICS

The following are anxiety scores for 10 patients receiving a new drug and a placebo in

Drug					Patient	Numb	61		
Patient-Hs.	1	2	-3	4	5-1	.6	7	8	9 10
Drug	19	11	14	17	23	11	15	19	11 8
Placebo	22	18	17	19	22	12	14	11	19 7
Difference (d)	-3	-7	-3	-2	1	-1	1	8	-8 1

Is there any evidence of the difference between the drug and placebo in their effect of anxiery? Tes. Anxioty scores are higher on those with administration. the place bo

## Problem 2

In a health survey of school children it is found that the mean haemoglobin level of 51 boys is 10.2 per 100 ml, with a standard deviation of 2.1.

Can we consider this group as taken from the population with a mean of 11.0 g/100 ml?

G1= 1 + (1 + (- -----The mean level of prothrombin in the normal population is known to be approximately 20 Problem 3

mg/100 mL plasma and a standard deviation is <u>4 mg</u>/100 ml. A sample of <u>40</u> patients showing vitamin K deficiency has a mean prothrombin level of 18:50 mg/100 ml. How reasonable is it to assume that the true mean for patients with with mathematic televency is the same as that for the normal population?  $CI = actionate \pm R^*C \times SEM$ . 18.5 ± 1.96 × ± 171 19.74

A clinical trial was undertaken to assess the value of a new method of treatment () in comparison with the old treatment (). The patients were divided into two groups randomly. Of 257 patients treated with A, 41 died of the 244 patients with treatment B,

64 died. Test for equality of effectiveness of the two treatments, using both the Chi-square and Standard normal deviate (SND) tests of significance.

## Problem 5

In a study of the age of menarche in women in a certain community the following statistics were observed for samples of women aged 21 - 30 and 31 - 40 years.

	Women aged 31 - 40	Women ages 21 - 30
Sample size	66	78
Miean	13.88	12.42
Variance .	1.924	1 156

Is there any evidence that on average younger women's age of menarche is lower than that of older women?

I realized p

242 145

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5	CAT Mar 2012
9.9	A community diagnosis in Klambu involving a cluster redam sample of 500 households found 450 of the Lauseholds had VIP. lateres a toilets. what is the proportion of Lauseholds with no or poor quality toilet facilities? with down a 955 cs for the proportion of Lauseholds with no toilet facilities in this population.
D	CAT May 2013
Interest	In a survey on a community living ground a factory superchal to be chusing air pollution, the no. of hospital visits in the preceding your for the yourgest child 2 Syrs is recorded for a sample of howeboids as shown below:
NO.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 5 4 7 6 6 3 7 4 9 5 8 7 8 4 7 9 7 6 4 7 3
15 1	what is the median number of visits? calculate mean, variance, and SD. (we the individual value)
5	Chical the men, virince, the soluce the individue traces
9 0.	calculate the standard error of the mean
9 9 9	14.1
9 9 9	calculate the standard ever of the mean.
9 9 9	Calculate the standard error of the mean construct a 95% at cet for the mean number of hospital visits for the gaugest child $\angle 5$ grs in the population from twild this rendom sandle was atroum. Note: $t_{ipq}(19)=2.539; t_{ipq}(19)=2.8609; t_{ipq}=2.693; t_{ipq}(20)=2.8453.$
8 6 6	Calculate the standard error of the mean construct a 95% $\leftarrow$ CE for the mean number of incaretal visits for the gaugest child 2 Syrs in the population from truthich this render sample was drawn. Note: t.qq (19)=2-537; t.qqs (19)=2.8601; t. (19)=2.073; t. (20)=2.8453. .qqs <u>CAT Aug 2013</u> calculation of intervention to improve healthier lifestyles, the following
8 0 6	Calculate the standard error of the mean construct a 95% at the form minimum of incapatal visits for the gaugest child $45$ yrs in the population from twinth this render sample was atravan. Note: $t_{iqq}(19)=2.539; t_{iqq}(19)=2.8609; t_{iqq}=2.093; t_{iqq}=2.8453.$ <u>CAT Aug 2013</u>
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statis	tics wer	e observe	d for samp	les of wor	nen agou	P.	2-	i ije
			Won	nen aged 3	1-40	Wo	men aged	21-30
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Fasting blood glucose levels (FBGL) are measured on a random sample of 81 clients attending a wellness clinic with the following results:

 $\bar{x} = 5.2 \text{ g/dl}; s^2 = 27.5 \text{ g/dl}^2$ 

- a) Calculate the standard error of the mean (2 marks)
- b) Construct a 95% confidence interval for the mean FBGL in the population from which this sample was drawn. (3 marks)

Note: t<sub>.975</sub> (80) = 1.9901

**1.** Suppose it is known that 10 percent of a certain population is color blind. If a random sample of 25 people is drawn from this population, find the probability that:

(a) Three or fewer will be color blind (3 marks)

(b) Four or more will be color blind (2 marks)

**2.** If the mean number of serious accidents per year in a large factory (where the number of employees remains constant) is five, find the probability that in the current year there will be: (a) No accidents

(b) One accident

(c) Two or more

- **3.** The probability of experiencing moderate to severe side-effects with a new drug is 0.03. If 200 people take the new drug then:
  - (a) What is the probability that more than 8 people will experience moderate to severe sideeffects?
  - (b) What is the probability that the observed proportion of patients (in the 200) experiencing moderate to severe side-effects is less than 0.01?
  - (c) If the number of patients experiencing moderate to severe side-effects is distributed as a Poisson count with a mean of 3, what is the probability that 2 or more people will experience moderate to severe side-effects?