



THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF ANIMAL SCIENCE

COURSE NAME: INTRODUCTORY STATISTICS FOR AGRICULTURE

COURSE CODE: AGG 3842

TAKE HOME TEST

INSTRUCTIONS: Answer all the questions, each section in a separate answer booklet.
Submit any time before or on Monday 4th September 2023 to room one (1)

SECTION A

Question one (1) [21 Marks]

Below is a stem and leaf display of broiler chicken weights in grams, the Chickens were randomly sampled at the age of 6 weeks.

289	3 5 5 5 6
290	0 0 0 0 0 0 0 0 0
291	0 1
292	
293	9
294	1 2 3 4 5 6 7 8 9
295	
296	0 8 9
297	3
298	6 8
299	1 1 1 1 1 1 1 1 1
300	0

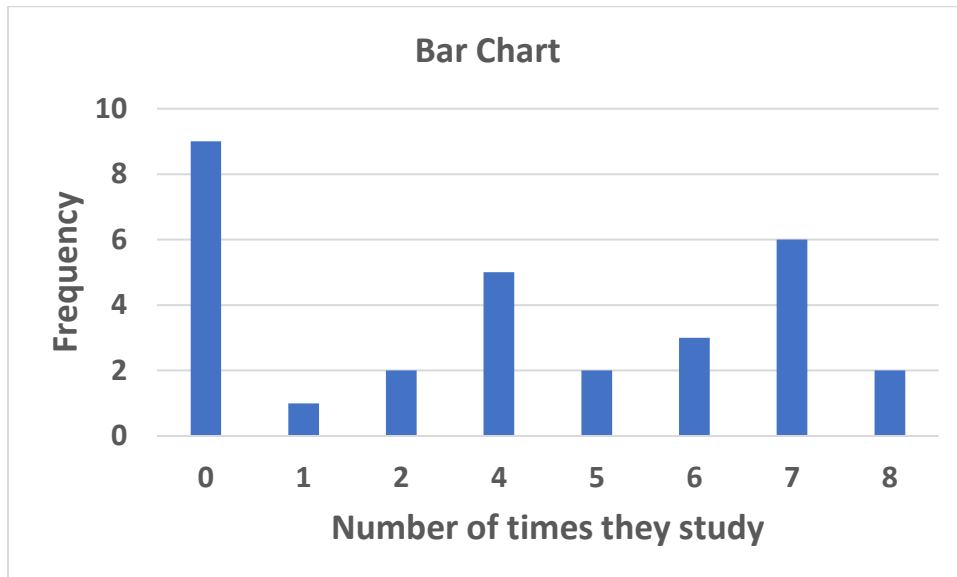
Key

$$293 \mid 9 = 2939 \text{ grams}$$

- What is the range of the chicken weights? [1]
- What is the mean weight of the chickens? [1]
- What is the median weight of Chickens? [1]
- What is the mode weight of Chickens? [1]
- What is the interquartile range of the Chicken weights? [2]
- What is the variance of the Chicken weights? [5]
- What is the standard deviation of the Chicken weights? [2]
- Summarise the given data set using a histogram. [4]
- Summarise the given data set using a frequency polygon. [4]

Question two [13 Marks]

30 randomly selected AGG 3842 students were asked to record the number of times they study the course AGG4832 per week, the Bar chart below describes the data set that was obtained.



- What is the range of times students study the course AGG 3842 per week? [1]
- What is the mean number of times students study the course AGG 3842 per week? [1]
- What is the median number of times students study the course AGG 3842 per week? [1]
- What is the mode number of times students study the course AGG 3842 per week? [1]
- What is the interquartile range of times students study the course AGG 3842 per week? [2]
- What is the variance of times students study the course AGG 3842 per week? [5]
- What is the standard deviation of times students study the course AGG 3842 per week? [2]

Question three Multiple choice [20 marks]

(1) In an expression shown below, what is 20 representing? [2]

$$\left(\begin{array}{c} 20 \\ 3 \end{array} \right) \left(\frac{1}{6} \right)^3 \left(\frac{5}{6} \right)^{17}$$

- (a) $17 + 3$
- (b) $P(X=x)$
- (c) n
- (d) x

(2) The probability of 8 in every 10 AGG 3842 students getting an A+ is 98%, $(n-x)$ in this scenario will be equal to what? [2]

- (a) 0.02
- (b) 2
- (c) 98% - 2%
- (d) 0.98

(3) A newly wedded couple in Lusaka announces that they plan to have four Children regardless of the behaviour of their first child and the circumstances they are possibly put through, what is the expected number of boys for their family? [2]

- (a) 1.5
- (b) 2
- (c) 2.5
- (d) 3.5

(4) Which one of the following datasets has no mode? [2]

- (a) 10, 10, 11, 11, 12, 12, 13, 13, 14, 14
- (b) 10, 11, 12, 13, 14, 14
- (c) 10, 11, 12, 13, 13, 14, 14
- (d) 10, 10, 11, 11, 12, 13, 13, 14, 14

(5) Three of the following are true about “Range” and “Interquartile range” except..... [2]

- (a) They are both differences between upper limits and lower limits
- (b) They are both measures of variability
- (c) They are both measures of spread of datasets
- (d) They are always whole numbers

(6) Which of the following is a discrete random variable? [2]

- (a) The time it takes a randomly selected AGG 3842 female student to study the course at night.
- (b) The amount of water required by a random tomato plant at the field station
- (c) The number of eggs collected from the poultry house on any given day

- (d) Amount of sugar a random student would add to their cup of tea
- (7) A friend of yours who is a male mature student tells you that they have two children, and they tell you that one of the two is a girl but they don't tell you whether or not this girl came first or second, what is the probability that both of the children are girls? [2]
- (a) $1/3$
 - (b) $1/2$
 - (c) $2/2$
 - (d) $1/4$
- (8) In AGG 3842 class, the number of pencils owned by each student is the random variable K with $P(K=0) = 0.6$, $P(K=1) = 0.2$, and $P(K=2) = 0.2$, calculate the mean of this probability distribution. [2]
- (a) 2
 - (b) 1.5
 - (c) 1
 - (d) 0.5
- (9) In a random experiment, the observations of a random variable that one makes are classified as; [2]
- (a) Compositions
 - (b) Events
 - (c) Collections
 - (d) Outcomes
- (10) In a normal Distribution, three of the following are correct except; [2]
- (a) Mean = median
 - (b) Mean = mode
 - (c) Mode = median
 - (d) Can be skewed to either left or right

Question four. [10 Marks]

Suppose four Zambian one-kwacha fair coins are flipped at the same time but only once.

- a) Indicate all possible combinations of obtaining birds [3]
- b) Write a probability distribution of obtaining birds [7]

Question five. [8 Marks]

You get a six-sided die with no numbers on any sides, you mark it with a 4 on one of its six sides, mark it with a 3 on its two sides, and you mark it with a 2 on the rest of the sides. Your marked die is then flipped twice and the two numbers obtained are added to get a sum. Write a

probability distribution table indicating the possible sums of two sides after two flips and their respective probabilities. [8]

Question Six. [10 Marks]

Football has 10 players from each side on the pitch excluding the goal keepers. Assuming that the probability of each player finishing a 90 minutes match is 0.9, and assuming that a team can never win a match if 3 players are unable to finish a 90 minutes match without any substitutions. What is the probability that 7 or more football players will finish the match on a given matchday? [5]

A student from AGG 3842 class is asked to answer a quiz of five multiple-choice questions. Each question has four possible responses but only one response is correct. If a student is only going to guess at random for each question. Calculate the probability for each possible score on the quiz from 0 to 5. [5]

SECTION B

Questions. [18 marks]

- 1) **State** whether the investigation below is an observational study or a designed experiment study. **Justify** your answer in each case;
 - a. The Salk Vaccine, a polio vaccine, was developed by Jonas Salk from University of Pittsburg, in an attempt to prevent polio. Two determine the vaccine's efficacy, two million school children were evaluated. Half received the vaccine and half received a placebo (mixture of salt and water). Neither children nor doctors knew which children belonged to which group, only the evaluation center knew. Results showed that polio cases reduced in the group inoculated with the Salk Vaccine. Researchers concluded that it would be effective in reducing polio and therefore should be made available to the public. [6]
 - b. A study titled "Body composition of elite class distance runners" was conducted to determine whether elite distance runners (long distance runners) actually are thinner than other people. Researchers measured skin-fold thickness, an indirect indicator of body fat, of runners and non-runners in the same group. Results were published in a human physiological journal. [6]
 - c. Results of a study of methods for treating patients who had advanced heart failure were published in a scientific medical journal. 1520 patients were randomly assigned in a 1:2:2 ratio to receive pharmacologic therapy alone, or in combination with a pacemaker or pacemaker plus defibrillator combination. Patients were then observed until they died or hospitalized for any cause. [6]