$\frac{429}{41650}$

$\frac{11}{4165}$

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA
DEPARTMENT OF MATHEMATICS
Rain Mid-Semester Examination, 2019/2020 Session
STT 202-Probability Distributions I

25th August, 2019. **TYPE II** Time: 1 hour

INSTRUCTIONS: Attempt all questions. All undefined symbols have their usual meanings. Write your **Names, Registration Number** and **Question Type** boldly on your **Answer sheet**. Use **HB** pencil only.

1. For what value of C is the function $f(x)=c\left(\frac{1}{4}\right)^x, (x=1,2,3,\cdots)$ serves as probability density function of a random variable X.

   (a). 1, (b). 3, (c). 5, (d). $\frac{12}{52}$

2. The intramuscular (IM) versus Oral Administration (OA) of antibiotics to students from faculty of science and those from faculty of Social and Management Sciences (SMS) who attended the health center in January 2021 gave the following result.

Antibiotics\Faculty	Science	SMS
IM	30	16
OA	26	40

   Determine the probability if a science student or a student who received an oral administration is selected.

   (a). $\frac{33}{56}$, (b). $\frac{56}{112}$, (c). $\frac{96}{112}$, (d). $\frac{1}{2}$

3. Four cards are drawn from a standard pack of cards, what is the probability that two or fewer are Space?

   (a) $\frac{11}{13}$, (b). $\frac{11}{4165}$, (c). $\frac{5}{112}$, (d). $\frac{19912}{20825}$

4. Suppose A and B are two independent events with probabilities 0.45 and 0.30 respectively. Find P(A|B)

   (a). 0.45, (b). 0.30, (c). 0.135, (d). 0.75

5. Suppose a coin is loaded such that a Head is likely to appear thrice more than a tail, what is the probability of a tail?

   (a). $\frac{3}{4}$, (b). $\frac{3}{8}$, (c). $\frac{1}{4}$, (d). $\frac{1}{8}$

Use the following information to answer question (6) and (7)

A random variable X has a mean $\mu = 10, \sigma^2 = 4$ and an unknown probability distribution.

6. The $P(|X-10| \geq 3)$ is at most

   (a). $\frac{4}{9}$, (b). $\frac{5}{9}$, (c). $\frac{1}{9}$, (d). $\frac{8}{9}$.

7. The $P(5 < X < 15)$ is at least

   (a). $\frac{4}{25}$, (b). $\frac{21}{25}$, (c). $\frac{1}{25}$, (d). $\frac{24}{25}$.

8. Which of the following is not true about Bernoulli experiment?

   a. The experiment consists of n repeated trials.
   b. Each trial result in outcome classified as success or failure
   c. The probability of success remains constant from trial to trial

$\frac{429}{41650}$ $\frac{429}{20825}$ $\frac{1727}{41650}$

$|x-10| \geq 3$

$10-5(2) < x <$

d. The random variable X is number of success in n trials.

9. The mean and variance of hypergeometric distribution with parameters N, n and k are respectively.

(a). $\mu = nk, \sigma^2 = nNk$, (b). $\mu = k,\ \sigma^2 = nN$,

(c). $\mu = \frac{nk}{N}$, $\sigma^2 = \frac{N-n}{N-1}$, (d). $\mu = \frac{Nk}{n}$, $\sigma^2 = \frac{N-n}{N-1}.N.\frac{k}{n}\left(1-\frac{k}{n}\right)$.

10. Which of the following distributions has same values for the estimate of the mean and variance.

(a). Negative Binomial (b). Binomial (c). Poisson (d). Multinomial.

11. The average number of oil tankers arriving each day at a facility is 5. Suppose the facility can handle at most 6 tankers per day, what is the probability that in a given day, tankers have to be turned away?

~~(a)~~. 0.238 (b). 0.762 (c). 0.791 (d). 0.284

12. The following are properties of a distribution function except

a). $0 \le F(x) \le 1$ (b). F(x) is a non-decreasing function (c). F(x) is a non-increasing function, (d). $F(-\infty) = 0,\ F(\infty) = 1.$,

13. If A and B are independent then, which of the following is/are correct?

(I). $P(A \cap B) = P(A).P(B)$, (II). $P(A \mid B) = P(A)$, (III). $P(B \mid A) = \frac{P(A \cap B)}{P(A)}$

a. I only, (b). I and II, (c). II only, (d). All of the above

14. Two cards are drawn from a deck of 52 cards; find the probability that the second card is a heart.

b. $\frac{1}{2}$, (b). $\frac{1}{52}$, (c). $\frac{1}{4}$, (d). $\frac{12}{52}$

15. A fair die is tossed twice, find the probability of getting a 2, 4 or 6 on the first toss and 3, 4 or 5 on the second toss.

(a). $\frac{1}{4}$, (b). $\frac{3}{4}$, (c). $\frac{9}{4}$ (d). $\frac{12}{52}$

16. Arising from question (4), what can you say about the two events

Dependent events, (b). Mutually exclusive Events, (c). Conditional Events, (d). Independent Events.

17. In a lots of 40 components each are called acceptable if they contain as many as 3 defectives or more. The procedure for sampling the lot is to select 5 components at random and to reject the lot if a defective is found. What is the probability that exactly 1 defective item is found in the sample if there are 3 defectives in the entire lots?

(a) 0.3011 (b). 089, (c). 0.[illegible]022, (d). 0.6078.

Use the following information to answer question (18) - (20)

Suppose a roll of 20 voters is taken in a city. The purpose is to determine x, the number who voted a candidate. Suppose that 60% of all the city's voters favor the candidate, Find

18. The mean and standard deviation respectively

(a). 10 and 2.4 (b). 12 and 2.19 (c). 1[illegible] and 4.8 (d). 10 and 2.19.

19. What is $P(X \le 10)$?

(a).0.416 (b). 0.642 (c). 0.314 (d). 0.245.

20. What is $P(X > 10)$?

(a) 0.755 (b). 0.645 (c). 0.245 (d). 0.455.

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
MID-SEMESTER TEST (2nd SEMESTER 2019/2020 SESSION)

COURSE TITLE: SPHERICAL AND FIELD ASTRONONY; COURSE CODE: SVG 208
CLASS: 200 LEVEL SURVEYING AND GEOINFORMATICS
INSTRUCTIONS: ***Attempt ALL questions by fill in the blanks spaces with suitable word(s).***

15/20

Student Name: [redacted]

Matric. No: [redacted] **Time Allowed: 15 Minutes**

1. The amount by which the sun of the 3 angles of a spherical triangle exceeds 180^0 is known as Spherical Excess
2. The name of natural satellite of the earth is moon
3. A small circle that parallel to the celestial horizon is known as: Almucanter
4. The Napier rule of five circular parts to right angled type of spherical triangle
5. The great circle passing through the Zenith, Nadir and the Poles is known as celestial meridian
6. The Altitude of the pole is always equal to the latitude of the place
7. The conditions for elongation of star are:
   a. Azimuth is minimum b. Parallactic angle is 90°
   c. the azimuth is greater than the latitude d. altitude is greater than the longitude
8. The correction that is not applicable to the star observation is Parallax correction
9. The angular difference between Grid meridian and True meridian is termed convergency of meridian
10. Astronomic azimuth is based on ~~Grid~~ True North.
11. Hour angle method of Astronomical Azimuth determination depends on accurate timing; while altitude/ex-meridian method depends on accurate altitude.
12. Greenwich Mean Time (GMT) is the same as Universal time (UT)
13. Elongation is an instant and can only be observed once on a single face. This instant can be missed if:
    a. there is bad weather condition
    b. there is error in setting the instrument
    c. there is instrumental error
    d. there is fault in programming

$(pe^t+q)^n$

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA
DEPARTMENT OF MATHEMATICS
RAIN SEMESTER EXAMINATION, 2019/2020 SESSION
STT 202-PROBABILITY DISTRIBUTIONS I

Time Allowed: 2 hours;30 Mins

Date: 27th September,2021

Instructions: Answer any four (4) questions. Write your name and registration number and department boldly.

(1a) Define the following concepts of probability:

(i) Mutually Exclusive Events

(ii) Dependent Events

(iii) Independent Events

(1b) (i) State without prove Bayes' theorem

(ii) Consider 2 urns, the first containing 2 white and 7 black balls and the second containing 5 white and 6 black balls. We flip a fair coin and draw a ball from the first urn or second urn depending on whether the outcome was Head or Tail. What is the probability that the outcome of the toss was Heads given that a white ball was selected. 1/9

(1c) Consider the experiment of tossing two dice. Let A denotes the event of an odd total, B the event of an Ace on the first die and c the event of a total of seven.

(i) Prove if A and B are independent

(ii) Show if A and C are independent

(iii) Show if B and C are independent

(2a) (i) State the axioms of probability

(ii) For what value of c is the function

$$P(X = x) = c\left(\frac{1}{4}\right)^x, \quad x = 1, 2, 3, \ldots$$

serves as probability density function of a random variable X

(2b) (i) A fair die is tossed twice. Find the probability of getting a 2,4 or 6 on the first toss and 3, 4 or 5 on the second toss.

(ii) Describe the two events?

(2c) The intramuscular (IM) versus Oral Administration (OA) of antibiotics to students from faculty of science and those from faculty of Social and Management Sciences (SMS) who attended the health center in January 2021 gave the following result.

Antibiotics Faculty	Science	SMS
IM	30	16
OA	26	40

Determine the probability that:

(i) A science student who received an oral administration was selected; 13/54

(ii) A science student or a student who received an oral administration was selected; and 6/9

(iii) Student who received an oral administration was selected. 33/54

(3a) A random variable X has a mean $\mu = 10$ and variance $\sigma^2 = 4$. Using Chebychev's theorem, find:

(i) $P(|X - 10| \geq 3)$; and

(ii) $P(5 < X < 15)$.

$|X - \mu| > k\sigma$

$\mu - k\sigma < X < \mu + k\sigma$

$(pe^t + q)^n$

$pe^t.$

$npe^t(pe^t + q)^{n-1}$, $n(n-1)p^2e^{2t}(pe^t+q)^n$

$(pe^t + q)$, npe^t

$np + n^2p^2 - n$

(3b) Suppose a random variable Y with probability of success p in n trials follows a binomial distribution. Obtain about the origin the

(i) Moment generating function; hence

(ii) the mean and the variance.

(4a) State the properties that identify Poisson experiment, $P(\lambda)$.

(4b) Suppose $W \sim B(n, p)$, where $B(n, p)$ is a binomial distribution with probability of success p in n trials for each value, $x = 0, 1, 2, \ldots$, and as $p \to 0$ with $np = \mu$ constant. Prove that

$$\lim_{n\to\infty} \binom{n}{x} p^x (1-p)^{n-x} = \frac{e^{-\mu}\mu^x}{x!}$$

(5). a. Let Y be a continuous random variable with probability density function (pdf)

$$f_Y(y) = 3y^2 \quad , \quad 0 < y < 1$$

and

$$f_Y(y) = 0; \quad \text{otherwise.}$$

(i.) Find the cumulative distribution function (cdf denoted by $F_U(u)$) of $U = 2Y + 3$ for $3 < u < 5$.

(ii.) Find the pdf for 5a(i).

b. Let X and Y be two continuous random variables with joint pdf

$$f_{X,Y}(x, y) = cx^2y(1 + y) \quad \text{for} \quad 0 \le x \le 3;\ 0 \le y \le 3$$

and

$$f_{X,Y}(x, y) = 0; \quad \text{otherwise.}$$

(i.) Find the value c.

(ii.) Find the marginal pdf of X, denoted by $f_X(x)$ directly from $f_{X,Y}(x, y)$

(iii.) Find the joint cdf of X and Y, denoted by $F_{X,Y}(x, y)$ of $f_{X,Y}(x, y)$.

(iv.) Find the marginal cdf of X, denoted by $F_X(x)$ of 5b(iii),

(v.) Show that 5b(ii) is the derivative of 5b(iv).

(vi.) Are X and Y independent?

6.(a) Define a moment generating function of a random variable X having a pdf $f(x)$

(b) Suppose that X has continuous random variable with probability density function;

$$f_X(x) = \lambda e^{-\lambda x}; \qquad 0 < x < +\infty.$$

Show that the moment generating function (mgf) of the continuous random variable X, is

$$M_X(t) = \frac{\lambda}{\lambda - t}$$

(c) Find the mean and variance of the continuous random variable X.

(d) Comment about the $M_X(t)$ of 6.(b).

(e) Suppose that the continuous random variable Y has the following mgf:

$$M_Y(t) = \frac{e^t}{4 - 3e^t}; \quad t < -\log(0.75).$$

Find,

(i.) The expectation of Y, denoted by $E[Y]$ and

(i.) The expectation of Y^2, denoted by $E[Y^2]$.

$e^{tx} xe^{-xn}$

$np(p+3)^{n-1}$

xe^{-xn}

e^{tn}, xe^{-xn}

e^{tx-xn}

$e^{n(1-x)}$

ESM/2018/077

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
RAIN SEMESTER EXAMINATION (RAIN SEMESTER 2019/2020 SESSION)

COURSE TITLE: Spherical and Field Astronomy; **COURSE CODE**: SVG 208
CLASS: 300 Level - Surveying and Geoinformatics
INSTRUCTIONS: Attempt any 3 questions. All questions carry equal marks.
TIME ALLOWED: 2 hours

1. a. In a spherical triangle *ABC*, prove from the first principle that:
   $$\text{Sin}a/\text{Sin}A = \sin b/\text{Sin}B = \text{Sin}c/\text{Sin}C.$$
   b. Solve completely the spherical triangle ABC, given that: $a = 47^\circ 48'$, $b = 39^\circ 51'$, $C = 68^\circ 37'$.

2. a. With the aid of sketch, distinguish between small circle and great circle. Give an example of each circle.
   b. List the 3 major uses of Field/Geodetic Astronomy.
   c. Draw a neat diagram of ***semi-celestial*** sphere and show the following:
   Celestial Horizon, Celestial equator, Hour circle, Vertical circle, Prime vertical, Zenith, North Pole, Almucantar circle, Observer's meridian and a heavenly body.

3. a. Highlight the composition of the Solar System
   b. What is the use of the ***Star Almanacs for Land Surveyors*** in Astronomical determinations?
   c. Name the 3 major co-ordinate systems of the Celestial Sphere. Why do we have the co-ordinate systems?

4. a. Name the three basic categories of instruments used for observations in Field/Geodetic Astronomy for the determination of Latitude, Longitude and Azimuth. Give 2 examples of each category.
   b. Identify the corrections that are applied to observed altitudes and directions in Astronomical measurements.
   c. Criticize the method of determining Astronomical azimuth from the Elongation observations.

5. a. Briefly describe any two methods you can adopt to set your telescope in the meridian.
   b. Mention 5 methods of determining Latitude by Astronomical method.
   c. A star was observed for latitude determination, and its corrected altitude was $40^\circ 36' 30''$. If the declination of the star was $10^\circ 36' 40''$ and the hour angle was $46^\circ 36' 20''$ determine the Latitude of the point of observation.

DEPARTMENT OF SURVEYING AND GEOINFORMATICS
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
OBAFEMI AWOLOWO UNIVERSITY

2019/2020 ACADEMIC SESSION **RAIN SEMESTER**

SVG 202: LARGE SCALE SURVEYING EXAMINATION

TimeAllowed: 2 hours

ANSWER ANY 3 QUESTIONS

1a. The table below gives the final coordinates of a computed traverse observation. Determine the bearings, distances,angles subtended between the traverse lines and the total area covered by the traverse. **15 mks**

EASTING (m)	NORTHING (m)	STATION
645543.437	876965.527	PL4
645576.812	876969.117	PL5
645575.295	876984.709	PL6
645576.812	876969.117	PL7
645543.437	876965.527	PL4

1b. Define the following terms

a. Traverse stations
b. Traverse legs
c. Reduced level
d. Datum
e. Bench mark 5 mks

2a. Control survey is usually carried out as reference base for future surveys along both horizontal and vertical datum. Traditionally, methods of triangulation, trilateration, traversing, Global Positioning System (GPS) or a combination of any of these techniques may be used. Describe a systematic procedure of how you would determine positions along X and Y component axes (Northings and Eastings) using any of these method. **10 mks**

2b. *Determine the missing values from GPS control survey on the computation table below.*
Recall that$N_B = N_A + L\cos\Theta$ and $E_B = E_A + L\sin\Theta$ for any traverse line. **10 mks**

Station From	Bearing	Distance (m)	ΔN (LCOSΘ)	ΔE (LSINΘ)	Northings	Eastings	Station To
					825339.245	673072.708	OCSF109S
OCSF109S	150° 51′ 49″	414.259	-361.840	201.699	?	673274.407	OCSF110S
OCSF110S	154° 12′ 25″	416.275	-374.801	?	824602.604	673455.539	OCSF111S
OCSF111S	158° 10′ 49″	499.339	?	185.600	?	?	OCSF112S
OCSF112S	175° 26′ 12″	180.582	-180.009	?	823959.030	673655.507	OCSF113S
OCSF113S	185° 07′ 05″	369.053	-367.582	-32.922	823591.448	673622.585	OCSF114S
OCSF114S	158° 08′ 53″	266.181	?	?	?	673721.661	OCSF115S
OCSF115S	139° 31′ 11″	803.988	-611.536	521.939	822732.857	?	OCSF116S
OCSF116S	120° 13′ 27″	533.676	-268.643	461.130	822464.214	674704.730	OCSF117S

3a. Define the following terms:

a. Accuracy
b. Precision
c. Most Probable Value
d. Root Mean Square Error
e. Standard deviation **16mks**

3b. Tachometry surveying adopts the principle of isosceles triangle to determine both horizontal and vertical distances on difficult terrains. Show that D=100S for horizontal distance measurement using optical method **10 mks**

4a. You have carried out a direct measurement for horizontal distance determination from O.A.U campus to F.U.T.A North gate, describe the corrections required on the measurement for the determination of true horizontal distance. **8mks**

4b. A base line was measured with two Total station A and B under the same atmospheric conditions. Test the relative precision of the two instruments and determine the MPV of the length of the base line. **12 mks**

Total Station Instrument A	Total Station InstrumentB
55.023m	55.009m
55.021m	55.023m
55.022m	55.025m
55.024m	55.022m
55.009m	55.024m

5a. Write short note on the following:

i. Stadia method of tacheometry
ii. Tangential method of tacheometry 6mks

5b. To determine the distance between points A and B, a tacheometer was set up at P and the following readings taken:

Staff at A: Staff reading = 2.228, 2.603, 2.982 and vertical angle given as $7^{0}50'$
Staff at B: Staff reading =1.620, 1.900, 2.000 and vertical angle as $-1^{0}44'$

The horizontal angle APB = $68^{0}\ 30'\ 30''$ and elevation at A = 310.400m. Determine the distance AB and the elevation of B **14 mks**

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
Rain Semester Examination 2019/2020 Session
SVG 204: Topographical Surveying

Answer any three questions.

Time Allowed: 2Hours

1. Give a brief explanation of the following:
   i. Topography
   ii. Triangulation
   iii. Trilateration
   iv. Intersection
   v. Resection

   20 Marks @ 4 each

2. a. Discuss the relationship between Topographical Surveying and Photogrammetry — 8 Marks
   b. A statement was once made by the Surveyor-General of the Federation that, "It is important for any topographical mapping project to be based on a well established ground control" Discuss the truth or otherwise of this statement — 6 Marks
   c. What is the objective of Topographical Surveying? — 2 Marks
   d. Differentiate between Topographic Surveying and Route Surveying — 4 Marks

3. You are required to carry out the topographical survey of five plots of land acquired by your uncle. Explain how you will carry it out. — 20 Marks

4. a. Highlights and briefly explain any three medium scale mapping Methods — 10 Marks
   b. Discuss any satellite imagery that can be used for the determination of the configuration of the Earth Surface — 10 Marks

5. You are required to map Ile-Ife town. Discuss how you will carry out this project — 20 Marks