

BAYERO UNIVERSITY, KANO
ACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE

e: CSC1311/CST 1311

Action: Answer Any Two (2) Questions

TEST

Duration: 1 hour

The distribution in Table 1 below contains the sample of efficiencies for the 2009 Ford Focus equipped with an automatic transmission reported by users in a survey by the Ford car company.

Table 1: Fuel efficiency of car users in mph

Car User	1	2	3	4	5	6	7	8	9	10
Fuel efficiency X	30.9	31	36.1	38.5	48.8	43.5	33.7	33	31.8	35.8

Use the information provided in Table 1 to write the formulas and calculate the following measures of dispersion.

- a. Find the range
 - b. The mean absolute deviation
 - c. The variance
 - d. The standard deviation
- ✓ 2. Given a set $A = \{x|x = (p+1)^2, 2 < p < 7\}$ and $B = \{y|y = 3q, 2 < q < 7\}$ Answer the following questions.
- a. List the elements of A
 - b. List the elements of B
 - c. Find $A \cap B$
 - d. Find $A \cup B$
 - e. Let $C = A \cup B$, from C, find B' .
 - f. Let $C = A \cup B$, from C, find $A' \cap B'$.
 - From A, find the number less than 5.

$$\sigma^2 = \frac{\sum_{i=1}^{10} (x_i - \bar{x})^2}{n}$$

- ✓ 3. Observation over a long period of time has shown that a particular salesman can make a sale on a single contact with the probability of 20%. Suppose the same person contact four prospects,
- (a) What is the probability that exactly 2 prospects purchase the product?
 - (b) What is the probability that at most 2 prospects purchase the product?
 - (c) What is the probability that all the prospects purchase the product?
 - (d) What is the expected value of the prospects that would purchase the product?

$$P = \frac{20}{100} = 0.2$$

$$q = 1 - 0.2 = 0.8$$

$$n = 4 \quad (p+1)^2 = p^2 + 2p + 1$$

$$(p+1)(p+1) = p(p+1) + p(p+1)$$

$$p^2 + 2p + 1 = p^2 + p + p + 1$$

$$(p+1)^2 = p^2 + 2p + 1$$

$$p^2 + 2p + 1 = 1$$

$$\{-1, -2, -3, -4, -5, -6, \dots, 6\}$$

$$\binom{n}{k} p^k (1-p)^{n-k}$$

$$p^k = \frac{1}{2^k}$$

$$p^2 = \frac{1}{4}$$

$$p^3 = \frac{1}{8}$$

$$p^4 = \frac{1}{16}$$

$$p^5 = \frac{1}{32}$$

$$p^6 = \frac{1}{64}$$

5. Two cards are selected at random from 12 cards numbered 1 to 12. Find the probability p

- a. Two cards are selected at random from 12 cards numbered 1 to 12. Find the probability p that:
- (i) The sum is even if the two cards are drawn one after the other with replacement
 - (ii) The sum is odd if the two cards are drawn one after the other without replacement
- b. Find the expectation of a discrete random variable X whose probability function is given by

$$f(x) = \left(\frac{1}{2}\right)^x, \quad \text{where } (x = 1, 2, 3, \dots)$$

6. a. The probability of a random variable X is shown in the table below

- i. Find the distribution function of X
- ii. Graph the distribution function

x	1	2	3
f(x)	1/2	1/3	1/6

b. A fair coin is tossed four times. Let Y denote the number of tails occurring. Find the distribution and the mean

7. The table below shows some data obtained from 11 families which include the weight of the father x and the weight of the first son y.

X	65	55	58	87	76	40	68	35	55	74	98
Y	58	65	52	72	70	50	78	40	48	80	88

- a. Calculate
- i. The Pearson's Correlation Coefficient
 - ii. The Spearman's rank correlation coefficient
- b. Estimate the regression of Y on X
- c. Interpret the correlation coefficient in (a) above

BAYERO UNIVERSITY, KANO

DEPARTMENT OF COMPUTER SCIENCES,

First Semester Examination 2017/2018 Session,

CST1311 - (Introduction to Probability)

Time: 2 Hours 30 Minutes

Instruction: Answer any Five (5) Questions

1. a. During the fresh student orientation at the University, among the 340 fresh students, 230 students attended the University orientation, 100 students attended the Faculty orientation, 84 students attended the Departmental orientation, 40 students attended University and Faculty, 60 students attended University and Departmental and 40 students attended Faculty and Departmental, while 16 students attended all the three orientation.

- Draw a Venn diagram to illustrate this information.
- How many students attended at least one of the events?
- Find the number of students who attended exactly one
- How many students didn't attend any of the orientation?

- b. Consider the universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15\}$ and sets $A = \{1, 5, 7, 11\}$, $B = \{2, 3, 5, 10, 15\}$, $C = \{1, 2, 3, 4, 8, 13, 14\}$, find

- $(A \cap B)'$
- $(A \cup C) \setminus B$
- $(A \cup C) \setminus (A \cup B)$
- $A' \cap (C \cup B)'$

2. a. Three students A, B and C are in a swimming race. Assuming there are no ties, A and B have the same probability of winning and each is four times as likely to win as C. Find the probability that A or B wins

- b. Let A and B be events with $P(A) = 0.35$, $P(A \cup B) = 0.55$, and $P(B) = m$, find m if

- A and B are disjoint
- A and B are independent
- A is a subset of B

3. a. Assuming in Lecture room II, 45% of the men and 5% of the women likes Football. Furthermore, 25% of the students are women. Now if a student is selected at random and that student likes Football, what is the probability that the student is a woman?

- b. A fair of pair die is tossed let X denote the maximum of the two numbers that comes up (i.e. $X(a, b) = \max(a, b)$). Find the probability and distribution function of X.

4. a. A coin is biased such that the tail is thrice as likely to occur as head. This coin is tossed until a head appears, Let the random variable Z be the number trials until the head appears including the trial in which it appears. Find the distribution of Z and show that it is indeed a probability function.

- b. Let P a probability function on $S = \{c_1, c_2, c_3\}$. Find $P(c_1)$ if

- $P(c_2) = 0.4$ and $P(c_3) = 0.5$
- $P(c_3) = 2P(c_2)$ and $P(c_3) = 3P(c_1)$

- Answer the following
3. Given a set $A = \{x|x = a^2, 1 < a < 5\}$ and $B = \{y|y = 3b, 1 < b < 5\}$
- questions.
- List the elements of A
 - List the elements of B
 - Find $A \cap B$
 - Find $A \cup B$
 - Let $C = A \cup B$, from C, find C' .
 - Let $C = A \cup B$, from C, find $A' \cup B'$.
 - From A, find D: a number less than 3.
4. Observation over a long period of time has shown that a particular salesman can make a sale on a single contact with the probability of 20%. Suppose the same person contact four prospects,
- What is the probability that exactly 2 prospects purchase the product?
 - What is the probability that at least 2 prospects purchase the product?
 - What is the probability that all the prospects purchase the product?
 - What is the expected value of the prospects that would purchase the product?
5. If the 3% of the electric doors manufactured by a company are defective. Find the probability that in the sample of 120 doors; at most 3 doors are defective.
- Use binomial to solve the problem o. 5115
 - Use Poisson distribution and compare your results. o. 5145
6. The marks obtained by 10 students in Mathematics and Physics examinations are as follows:

Mathematics	70	68	67	55	60	60	75	63	60	72
Physics	65	65	80	60	68	58	75	62	60	70

- Compute the correlation coefficient and interpret your result.
- Compute the regression of Y on X from the following data

X	1	2	3	4	5
Y	2	3	5	4	6

7. A researcher is interested in the mean level of some enzyme in a certain population. The data available to the researcher are the enzyme determination made on a sample of 13 individuals from the population of interest and the sample mean is 25. Assumed the sample came from a population that is normally distributed with a known variance 48. Can the researcher conclude that mean enzyme level in this population is different from 28? Take $\alpha = 0.05$.

Use the significance table below.

α	z_α
0.05	1.65
0.025	1.96
0.01	2.33
0.005	2.58

BAYERO UNIVERSITY, KANO
 FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
 DEPARTMENT OF COMPUTER SCIENCES
 2018/2019 First Semester Examination
 CSC1311/CST1311-STATISTICS FOR PHYSICAL SCIENCES

Instruction: answer any five (5) questions

Time Allowed: 3HRS

1. The distribution in Table 1 below contains the sample of efficiencies for the 2009 Ford Focus equipped with an automatic transmission reported by users in a survey by the Ford car company.

Table 1: Fuel efficiency of car users in mph.

Car User	1	2	3	4	5	6	7	8	9	10	11
Fuel efficiency	30.9	31	36.1	38.5	48.8	43.5	33.7	33	31.8	35.8	40.6

$$\bar{x} = 37.1$$

Use the information provided in Table 1 to write the formulas and calculate the following measures of dispersion. Computation in tabular format carries 3 marks.

- a. Find the range σ^2
- b. The mean absolute deviation σ
- c. The variance
- d. The standard deviation

2. A sample of 35 first year computer science students for CST 1311 in Bayero University, Kano was selected and the continuous assessment marks for each student is presented in the distribution table, Table 2, below.

Table 2: Marks for CST1311

Marks	(55.3-56.1)	(56.1-57.9)	(57.9-63.8)	(63.8-65.1)	(65.1-68.7)	(68.7-73.1)	(73.1-83)
No. of Students	6	8	11	3	9	1	4

Use Table 2 to compute the following measures of dispersion for the students in Tabular form.

Computation in tabular format carries 5 marks.

- a. The range
- b. Mean absolute deviation
- c. The variance
- d. The standard deviation

4. a. Three students A, B and C are in a swimming race. A and B have the same probability of winning and each is three times as likely to win as C. *Find the probability that B or C wins.*

b. Let P be a probability function on $S = \{c_1, c_2, c_3\}$. Find $P(c_1)$ if
 i. $P(c_2) = 0.2$ and $P(c_3) = 0.4$ ii. $P(c_3) = 2P(c_2)$ and $P(c_2) = 3P(c_1)$

5. A factory uses four machines W, X, Y and Z to produce certain items. Suppose Machine W produces 40% of the items of which 3% are defective; machine X produces 25% of the item of which 5% are defective, Machine Y produces 20% of the item of which 4% are defective and Machine Z produces 15% of the item of which 2% are defective. Suppose a defective item is found among the output find the probability it comes from
 ii. *Machine X* ii. *Machine W*

6. A random variable X has a density function $f(x) = cx, 0 \leq x \leq 2$, and 0, otherwise.
 Find i. *The constant c* ii. $P(X > 1)$

$$P(A_x) = P\left(\frac{e}{n_1}\right)$$

$\{a_n\}$ $\subset \mathbb{N} \subset \mathbb{Z}$
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CHAP. 11.]

$$\left\{ \mu^2 \int_0^2 u^{t+1} \right\}_{t=0}^1 = \left\{ \mu^2 C \int_0^2 \frac{u^2}{2} \right\}_{t=0}^1$$

Bayero University, Kano
Department of Computer Science
ESTU12201 TEST

Instruction: Attempts all questions MTH1301 TEST

Time: 1hr

- 1) a. Solve, by using completing square: $2x^2 - 6x - 1 = 0$

b. Expand $(2x + \frac{1}{2x})^3$ in descending power of x.

c. ABCD is a parallelogram where A is the points (2,3), B is (5,5), C(4,3) and D(1,1).
Are the diagonals equal?

b. Expand $(2x + \frac{1}{zx})^5$ in descending power of x.

Find the points A(2,3), B(5,5), C(4,3) and D(1,1).

- (c) ABCD is a parallelogram where $\angle A = 60^\circ$.

 - Show that the opposite sides of the parallelogram are equal.
 - Find the point where the two diagonal lines intersect.
 - Solve the following pair of simultaneous equations

$$\left\{ \begin{array}{l} 3x + 4y = 0 \\ x - y = 0 \end{array} \right.$$

$$\frac{t_1 - t_2}{t_1 + t_2} = T$$

b) Find the partial fractions for

- Ex. 11. Find the partial fractions of $\frac{1}{(x+2)(x-3)}$.
 Ans. For the series, write down the first four terms, and then add them together. Also, write down the n th and the $(n+1)$ th term.

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE
2018/2019 First Semester Examination
MTH1301: Elementary Mathematics I

Instruction: Answer Any Five (5) Questions

Time Allowed: 3 Hours

1. 1. Among 110 level 100 students of FCSIT, BUK, 30 students registered for MTH1301 (group A), 35 students registered for GSP1202 (group B), and 20 students registered for both MTH1301 and GSP1202. Find the number of students who:
 - Registered for MTH1301 or GSP1202
 - Registered for exactly one of the courses

(b) Translate the data above into Venn diagram

(c) Write the dual of each of the equations below:

 - $A = (B^C \cap A) \cup (A \cap B)$
 - $(A \cap B)(A \cap B^C) \cup (A^C \cap B) \cup (A^C \cap B^C) = U$
2. (a) Three consecutive terms of a geometric progression are 3^x , $3^{(x+1)}$ and 81. Find the value of x . If 81 is the fifth term of the geometric progression, find the seventh term.
- (b) Solve the following pair of simultaneous equations:

i. $\begin{cases} 4x - 3y = 11 \\ 2x - 2y = 30 \end{cases}$	ii. $\begin{cases} \frac{x}{2} + \frac{y}{3} = 5 \\ \frac{x}{3} + \frac{y}{4} = 1 \end{cases}$
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- (c) Find the coordinates of the midpoints of the straight lines joining these pairs of points. Hence find the distance between the two points in each case i. (-2, -1) and (3, 4) ii. (-1, -5) and (-4, -6)
3. (a) Find the term in x^7 in the expansion of $(1-x)^5(3+2x)^3$
- (b) When the functions $x^2 - ax + 3$ and $2a - x$ are divided by $x - b$, the remainders are 1 and 4 respectively. Find the values of a and b .
- (c) Find the constant term in $(2x^2 - \frac{4}{x})^6$
4. (a) A geometric series has first term a and the common ratio is $\frac{1}{\sqrt{2}}$. Show that the sum to infinity of the geometric progression is $a(2 + \sqrt{2})$
- (b) Find the first four terms of the expansion $(2x - y)^8$
- (c) Using completing the square solve: i. $3a^2 = 5 - 4a$ ii. $x^2 + 10x + 16 = 0$
5. (a) Solve the equation $\frac{(x+3)}{4} - \frac{(x-1)}{5} = \frac{(2x-1)}{10}$
- (b) Find the partial fractions for i. $\frac{x^3+3x^2+2x-3}{(x+2)(x-1)}$ ii. $\frac{4}{y(y^2+1)}$
- (c) For the following series, write down the four terms, and then add them together. Also, write down the n^{th} and the $(n+1)^{th}$ term. $\sum_{r=1}^n (2r+3)$
6. (a) Without using table or calculator show that:

i. $\sin 30^\circ = \frac{1}{2}$	ii. $\cos 30^\circ = \frac{\sqrt{3}}{2}$	iii. $\tan 30^\circ = \frac{1}{\sqrt{3}}$
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- (b) Prove without using table or calculator: $\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}$ and $\tan 45^\circ = 1$
- (c) Prove the identity $\frac{1+\sin\theta}{1-\sin\theta} = (\sec\theta + \tan\theta)^2$
7. (a) The formula $T = 2\pi\sqrt{\frac{l}{g}}$ gives the period T of a pendulum of the length l . The period is the length of time for a complete to-and-fro swings. π is the π of circles, and g stands for the acceleration due to gravity. Make the length l to be the subject of the equation.
- (b) Solve $\sin^2\theta + \sin\theta = 0$ for $0^\circ \leq \theta \leq 360^\circ$
- (c) Show that $\tan\theta + \cot\theta = \frac{1}{\cos\theta\sin\theta}$

a. the midpoint of AB is (7, -3). Find the values of d and e if A is the point (d, 0) and B is (-1, e)

$$\sin A \cos B + \cos A \sin B$$

✓ 5a. Solve the following pair of simultaneous equations

$$\begin{cases} \frac{3}{x} + \frac{4}{y} = 0 \\ \frac{2}{x} - \frac{2}{y} = 7 \end{cases}$$

✓ b. Find the partial fractions for

i. $\frac{x^3+3x^2+2x-3}{(x+2)(x-1)}$

ii. $\frac{4}{y(y^2+1)}$

iii. $\frac{4}{(x+1)(x-1)^2}$

✓ c. For the following series, write down the four terms, and then add them together. Also, write down the nth and the (n+1)th term. $\sum_{r=1}^n (2r+3)$

✓ 6a. Solve the equation of $1 + \cos \theta = 2 \sin^2 \theta$, for values of θ between 0° and 360°

✓ b. if $s = \sin \theta$, simplify

i. $\sqrt{(1-s^2)}$

ii. $\frac{s}{\sqrt{(1-s^2)}}$

c. Prove the identities.

i. $\frac{1-\cos^2 \theta}{\sec^2 \theta - 1} = 1 - \sin^2 \theta$

ii. $\cos 3A = 4 \cos^3 A - 3 \cos A$

✓ 7a. Eliminate θ from the following equations

i. $x = a \cot \theta, y = b \cosec \theta$ ii. $x = \sin \theta + \cos \theta, y = \sin \theta - \cos \theta$

✓ b. Prove that $\tan(A+B+C) = \frac{\tan A + \tan B + \tan C - \tan A \tan B \tan C}{1 - \tan A \tan B - \tan B \tan C - \tan C \tan A}$. Hence prove that if A, B, C are angle of a triangle, then $\tan A + \tan B + \tan C = \tan A \tan B \tan C$

✓ c. Find the values of the following without using table or calculator

i) $\cos 15^\circ$ ii) $\sin 75^\circ$

Mathematic

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✓ 1a. Solve each of the following

$$\text{i. } \frac{x+3}{4} - \frac{x-1}{5} = \frac{2x-1}{10}$$

$$\text{ii. } \frac{4}{2x+3} = \frac{3}{x-2}$$

✓ b. Solve, by using completing square: $2x^2 - 6x - 1 = 0$

✓ c. The formula $T = 2\pi \sqrt{\frac{l}{g}}$ Gives the period T of a pendulum of the length l. The period is the length of time for a complete to-and fro swings. π is the π of circles, and g stands for the acceleration due to gravity. Make the length to be the subject of the equation.

✓ 2 a. The first term of an A.P is a, the Second term is b, and the last term is c. show that the sum of the A.P is

$$\frac{(b + c - 2a)(c + a)}{2(b - a)}$$

✓ b. The first term of an A.P is -12 and the last term is 40. If the sum of the progression is 196, find the number of the terms and common difference.

c. The numbers $n+1$, $n+5$, and $2n+4$ are consecutive terms in a GP. Find the possible values of n, and the common ratio. Find also the values of three given terms in each case.

✓ 3a. i. Expand $(2x + \frac{1}{2x})^5$ in descending power of x.

ii. Expand binomial expression as far as the term in x^3 in the expansion of $(1 + 3x)^{-2}$.

✓ 4. Obtain the first four terms in the expansion of $(1 + 2x + 3x^2)^6$ in ascending power of x.

c. Find the constant term in the expansion of $(2x - \frac{3}{x})^8$

✓ 4.a. ABCD is a parallelogram where A is the points (2,3), B is (5,5), C(4,3) and D(1,1).

- i) Show that the opposite sides of the parallelogram are equal.
- ii) Find the point where the two diagonal lines intersect.

✓ b. Find the equation of the line with gradient $\frac{1}{2}$ which passes through (3,2).

c. i. Find the coordinates of the points which divide the line joining (-1,2) and (5,14) in the r

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCES,
 2017/2018 First Semester Examinations
MTH1301-(Elementary Mathematics I)

Instruction: Answer Any Five (5) Questions

Time Allowed: 3 Hours

✓ 1a. Solve each of the following

$$\text{i. } \frac{x+3}{4} - \frac{x-1}{5} = \frac{2x-1}{10} \quad \text{ii. } \frac{4}{2x+1} = \frac{3}{x-2}$$

✓ b. Solve by using completing square: $2x^2 - 6x - 1 = 0$

✓ c. The formula $T = 2\pi \sqrt{\frac{l}{g}}$ Gives the period T of a pendulum of the length l. The period is the length of time for a complete to-and fro swings. π is the π of circles, and g stands for the acceleration due to gravity. Make the length to be the subject of the equation.

✓ 2 a. The first term of an A.P is a, the Second term is b, and the last term is c. show that the sum of the A.P is

$$\frac{(b + c - 2a)(c + a)}{2(b - a)}$$

✓ 2 b. The first term of an A.P is -12 and the last term is 40. If the sum of the progression is 196, find the number of the terms and common difference.

c. The numbers $n+1$, $n+5$, and $2n+4$ are consecutive terms in a GP. Find the possible values of n, and the common ratio. Find also the values of three given terms in each case.

✓ 3a. i. Expand $(2x + \frac{1}{2x})^5$ in descending power of x.

ii. Expand binomial expression as far as the term in x^3 in the expansion of $(1 + 3x)^{-2}$.

✓ 3b. Obtain the first four terms in the expansion of $(1 + 2x + 3x^2)^6$ in ascending power of x.

✓ c. Find the constant term in the expansion of $(2x - \frac{3}{x})^8$

✓ 4.a. ABCD is a parallelogram where A is the points (2,3), B is (5,5), C(4,3) and D(1,1).

- i) Show that the opposite sides of the parallelogram are equal.
- ii) Find the point where the two diagonal lines intersect.

✓ b. Find the equation of the line with gradient $\frac{1}{2}$ which passes through (3,2).

c. i. Find the coordinates of the points which divide the line joining (-1,2) and (5,14) in the ratio

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCES.

First Semester Examinations 2015/2016 Session, MTH1301- (Elementary Mathematics I)

Time Allowed: 3 Hours

Instruction: Answer Any Five (5) Questions

1. a. Solve the equation $\frac{2x+1}{3} + \frac{x+5}{2} = \frac{3x-1}{7}$

b. Solve the pairs of simultaneous equations $\begin{cases} \frac{x}{8} - y = \frac{-5}{2} \\ 3x + \frac{y}{3} = 13 \end{cases}$

c. Solve the quadratic equation $x^2 - 6x + 8 = 0$ using the method of completing the square

2. a. When the functions $x^2 - ax + 3$ and $2a - x$ are divided by $x - b$, the remainders are 1 and 4 respectively. Find the values of a and b .

b. Find the coordinates of the points which divide the line joining (-1, 2) and (5, 14) in the ratio 2:1

c. A straight line has a gradient of $\frac{-3}{2}$ and passes through the point (1, 4). Find its equation and its intercept on the y-axis.

3. A descending geometric series has first term 1 and common ratio r is positive. The sum of the first 8 terms is twice the sum of terms from 6th to 15th inclusive. Prove that

$$r^5 = \frac{1}{2}(\sqrt{3} - 1).$$

4. Find the number of terms in this AP, 1, 3, 5, 7, ..., 33

5. An AP has 3 as its 1st term. Also the sum of the 1st 8 terms is twice the sum of the 1st 5 terms. Find the 1st term.

6. Find the term in x^{10} in the expansion of $(1 + \frac{1}{\sqrt{2}}x)^{20}$

7. Find the term in x^6 in the expansion of

i. $(y^2 - 2x^2)^{10}$

ii. $(2x - y)^8$

8. Expand as far as the term in x^3 for $(1 + 3x)^{-2}$

9. Resolve the following into partial fractions

i. $\frac{5}{(x-2)(x+3)^2}$

ii.

$\frac{A}{x(x^2+1)}$

iii.

$\frac{4}{(x+2)(x+3)}$

10. In an AP, the 8th term is twice the 3rd term and the sum of the first eight (8) terms is 32.

Find the sum of the first n terms in $\frac{3n}{8}(n+5)$

11. In the figure, the missing sides and angles in the triangle Triangle ABC in which $\angle C = 100^\circ$, $AB = 8$ cm and $BC = 5$ cm and also find the Area of the Triangle.

Sketch the triangle and show where the lines

i. $3y = x + 11$

ii. $x = 3y + 6$

Cut the circle whose equation is $x^2 + y^2 - 4x + 2y + 5 = 0$.

12. Prove that $\cos 3A = 4 \cos^3 A - 3 \cos A$

13. Find the values of the following without using calculator:

i) $\sin 50^\circ \cos 20^\circ + \cos 50^\circ \sin 20^\circ$

ii) $\frac{\tan 22.5^\circ - \tan 15^\circ}{1 + \tan 7.5^\circ \tan 15^\circ}$

14. Prove the following:

i) $\frac{1-\cos 2A}{\sin 2A} = \tan A$

ii) $\frac{1+\sin \theta}{1-\sin \theta} = (\sec \theta + \tan \theta)^2$

iii) $\tan \theta + \cot \theta = \frac{2}{\sin 2\theta}$

BAYERO UNIVERSITY KANO

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

MTH1301 TEST 2

TIME ALLOWED: 1 HOUR

1. a. The circle $x^2 + y^2 + 2gx + 2fy + c = 0$ passes through the points A (-1, -2), B (1, 2), C (2, 3). Write down three equations which must be satisfied by g, f, c. Solve these equations and write down the equation of the circle ABC.
- b. Find the length of the tangents from the point (5, 7) to the circle $x^2 + y^2 - 4x - 6y + 9 = 0$
- c. In triangle ABC, $a=4.73$, $c=3.58$ and $C = 42.12^\circ$. Calculate the size of angle A.
2. a. Prove the equation $\frac{1+\sin\theta}{1-\sin\theta} = (\sec\theta + \tan\theta)^2$
- b. Prove that $\tan(A+B+C) = \frac{\tan A + \tan B + \tan C - \tan A \tan B \tan C}{1 - \tan A \tan B - \tan C \tan A - \tan A \tan C}$. Hence prove that if A, B, C are angles of a triangle, then $\tan A + \tan B + \tan C = \tan A \tan B \tan C$
- c. Find the values of the following without using table or calculator: i) $\sin 15^\circ$ ii) $\cos 75^\circ$
3. a. i) Solve for value of x between 0 & 360, $2\sin x = \cos(x + 60^\circ)$ ii) Eliminate θ from the equation $x = \cos\theta$, $y = \operatorname{cosec}\theta - \cot\theta$
- b. Find the constant term in the expansion $(4x^2 + \frac{3}{x})^{12}$
- c. $\cos A = \frac{3}{5}$ and $\tan B = \frac{13}{5}$, where Both A and B are acute, Find the Values of i) $\sin(A - B)$ ii) $\tan(A - B)$

BAYERO UNIVERSITY KANO

Faculty of computer science and information technology

Department of computer science

TIME ALLOWED: 1 Hour

MTH1301 CA TEST

Instruction: Answer All Questions

1. a. A geometric series has first term a and the common ratio is $\frac{1}{\sqrt{2}}$. Show that the sum to infinity of the geometric progression is $a(2 + \sqrt{2})$

- b. List the elements of the following sets:

iii. $P = \{x: x \text{ is a multiple of } 3, 1 < x < 30\}$
 iv. $Q = \{x: x \text{ is a positive integer, } x^2 < 20\}$

- c. Find the constant term in $(2x^2 - \frac{4}{x})^6$

2. a. when the functions $x^2 - ax + 3$ and $2a - x$ are divided by $x - b$, the remainders are 1 and 4 respectively. Find the values of a and b .

b. Solve the equation $\frac{(x+3)}{4} - \frac{(x-1)}{5} = \frac{(2x-1)}{10}$

- c. Using completing the square solve $3a^2 = 5 - 4a$

Bayero University, Kano

COMPUTER SCIENCE LECTURE GROUP (LRM 1)

MTH1301: First CA Test

Answer ALL Questions

TIME: 1Hr

2018/2019 First Semester

1. If $x+1$ and $x-1$ are factors of the polynomial $x^3 + ax^2 + bx + c$, and it leaves a remainder of 12 when divided by $x-2$. Find a, b, c .

2. Use synthetic division to find the quotient and remainder when $4x^3 - 5x + 4$ is divided by $2x - 1$.

3. In a Computer Science lecture group, 79 students registered for statistics or programming course. The number of programmers is 1 more than thrice the number of statisticians. If 10 students are both programmers and statisticians, and everyone in the class is taking atleast one of the two specializations. Find the number of students taking:

i. Statistics 22

ii. Statistics only 12

iii. Programming 67

iv. Programming only

Muhammad Hassan: mhassan.se@buk.edu.ng

$$32 + 1 - 10x - 5 + 4 + 8x$$

$$- 10x + 8x + 32 + 1 - 5 + 4$$

$$- 2x + 33 + 1 - 2x + 34 =$$

$$\begin{array}{r} & 4 & -5x & 4 \\ 2x-1 \sqrt{ } & \overline{)4} & \overline{-8x} & \end{array}$$

$$\begin{array}{r} & 4x^2 & 0x^2 & \\ 2x-1 \sqrt{ } & \overline{)4x^3 - 5x + 4} & \overline{4x^3 - 2x^2} & \\ & 2x^2 - 5x + 4 & & \\ & 2x^2 - 2x & & \\ & \hline & 4x + 4 & \end{array}$$



BUK

Bayero University, Kano

DEPARTMENT OF PHYSICS

2021/2021 SESSION

TIME ALLOWED: 45 MIN

FIRST SEMESTER EXAMINATION

COURSE: PHY1210 Mechanics

INSTRUCTION: Answer all questions by choosing the correct option as appropriate.

1. All the following are sets of fundamental quantities EXCEPT? a. Mass, length and Temperature b. Time, Electric current and Mass c. Amount of substance, length and Electric current d. Mass, frequency, and Potential difference
2. One of the following options has wrong dimension. a. Velocity is LT^{-1} b. Force is MLT^{-2} c. Surface tension is $ML^{-1}T^{-2}$ d. Work is ML^2T^{-2}

Use this information to answer questions 3 and 4: If a mathematical relation is given by $T = k m^n L^p g^q$.

3. The respective values of n , y , and z are? a. $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$ b. $\frac{1}{2}, \frac{1}{2}, -\frac{1}{2}$ c. $\frac{1}{2}, 0, \frac{1}{2}$ d. $0, \frac{1}{2}, 0$
4. _____ is the mathematical expression of the relation. a. $T = k \sqrt{g} \sqrt{L} \sqrt{m} \sqrt{\frac{1}{g}}$ b. $T = k \sqrt{g} \sqrt{L} \sqrt{m}$
5. The equation for the density of earth (ρ_e) is given as? A. $\rho_e = \frac{r_e^2}{4\pi G}$ B. $\rho_e = \frac{4\pi r_e^3}{3G}$ C. $\rho_e = \frac{4\pi M_e}{3\pi r_e^3}$ D. $\rho_e = \frac{M_e}{4\pi r_e^3}$
6. Which of the following expression verify the variation of acceleration due to gravity? A. $g = \frac{1}{4}\pi G\rho_e(R + 2)$ B. $g = \frac{GM}{r^2}$ C. $g = \sqrt{GM/R}$ D. None of the above

Use this information to answer questions 7, 8, 9 and 10: If four (4) forces with their angles are defined as $F_1=19N$ & $\phi_1=90^\circ$, $F_2=15N$ & $\phi_2=60^\circ$, $F_3=16N$ & $\phi_3=45^\circ$, and $F_4=11N$ & $\phi_4=30^\circ$

7. What is the resultant force along the x -axis? a. 55.93N b. 47.33N c. 5.7N d. 29.80N
8. What is the resultant force along y -axis? a. 55.93N b. 47.33N c. 5.7N d. 29.80N
9. The equivalent resultant force along the x and y -axis? a. 55.93N b. 47.33N c. 5.7N d. 29.80N
10. The direction of the force will be? a. 27° b. 32° c. 41° d. 53°
11. A body moves with velocity $V = 5i + 2j - 3k$ under the influence of a constant force $F = 4i + 3j - 2k$. Determine the instantaneous power. (a) 67 W (b) 32 W (c) 100 W (d) 15 W
12. Power is defined as. (a) $P = FV$ (b) $P = F \times V$ (c) $P = F \cdot V$ (d) $P = FS$
13. Given the displacement vectors $A = 3i - 4j + 4k$ m and $B = 2i + 3j - 4k$ m, find the vector $D = A - B$. (a) $D = 8i - 11j + 4k$ m (b) $D = 8i + 5j + 4k$ m (c) $D = 4i - 5j + 4k$ m (d) $D = 4i - 11j + 12k$ m
14. Find the force of gravity between two lead balls of masses $m_1=20kg$ and $m_2=40kg$, if the distance between the centers is 10cm. (a) $5.34 \times 10^{-4}N$ b. $1.21 \times 10^{-4}N$ c. $3 \times 10^{-4}N$ d. $7.5 \times 10^{-4}N$

Use this information to answer question 15 and 16: A car moving at 30m/s slows uniformly to a speed of 10m/s in time of 6s.

15. Determine the acceleration of the car? a. $-2.5m/s^2$ b. $-4.0m/s^2$ c. $-6.5m/s^2$ d. $-8.0m/s^2$
16. The distance it move in the third second? a. 2.0m b. 3.7m c. 6.5m d. 5.3m

Use this information to answer question 17, and 18: An object starts from rest with a constant acceleration of $8.0m/s^2$ along a straight line.

17. Find the speed at the end of 8.00s? a. 20m/s b. 30m/s c. 40m/s d. 50m/s
18. The distance travel in the 5.0s? a. 75m b. 138m c. 100m d. 50m
- Use this information to answer questions 19, 20, 21 and 22: A ball is lifted with an initial velocity of $20m/s$ at an angle of 40° .*
19. The positions (S_1 and S_2) at 2 seconds will be? a. 18.5m and 32.1m b. 7.8m and 16.1m c. 30.64m and 5.71m d. 19.8m and 9.8m
20. The time taken to reach the maximum height and total time of flight will be? a. 2.57 and 1.29 b. 1.34 and 8.23 c. 5.6m and 12.3m d. 11.31 and 7.89m
21. _____ and _____ will be the respective values of Range and Height. a. 18.5m and 32.1m b. 39.4m and 8.26mm c. 30.64m and 5.71m d. 19.8m and 9.8m
22. The magnitude and direction of its velocity will be? a. $17m/s$ and 15° b. $20m/s$ and 40° c. $17m/s$ and 18° d. $27m/s$ and 25°

1. $v_f = v_i + at$ 2. $s = v_i t + \frac{1}{2}at^2$ 3. $s = ut + \frac{1}{2}at^2$ 4. $s = ut + \frac{1}{2}at^2$

5. $s = ut + \frac{1}{2}at^2$ 6. $s = ut + \frac{1}{2}at^2$ 7. $s = ut + \frac{1}{2}at^2$ 8. $s = ut + \frac{1}{2}at^2$

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