STATISTICS

1. (a). A certain set of data contain **p** zeros and **q** ones. Find the
   (i). Mean
   (ii). Standard deviation of the data
   (b) (i). Calculate the mean and standard deviation of the four number 2, 3, 6, 9.
   (ii). Two number a and b are to be added to this set of four number in bi), such that the mean is increased by 1 and the variance is increased by 2.5. Find a and b
   (c) The heights and corresponding masses of 7 tourists were taken, and ranked as shown. Calculate the spearman's' rank correction coefficient for this data. Comment on your result

	RANKS						
Height	1	2	3	4	5	6	7
mass	2	1	4	3	7	5	6

(OLAN)

2. The test marks of a certain group of candidates were distributed as follows:

Mark	$0<x\leq10$	$10<x\leq20$	$20<x\leq30$	$30<x\leq40$	$40<x\leq50$	$50<x\leq60$	$60<x\leq70$	$70<x\leq80$	$80<x\leq90$
Frequency density	0.3	0.6	0.9	1.0	1.2	1.8	1.4	1.1	0.7

   (a) Calculate the;
   (i) Mean mark.
   (ii) Standard deviation.
   (b) Construct the cumulative frequency curve and use it to estimate;
   (i) Number of student who scored below 58 marks.
   (ii) 25th percentile.

(JINJA COLLEGE)

3. The table below shows the distribution of the heights of students and their respective numbers in a certain school.

Heights	120-	130-	135-	145-	155-	170-	175-<190
Number of students	7	8	36	39	17	3	5

   (a) Construct an O-give and estimate the;
   (i) Medium.
   (ii) Number less than the height of 150.
   (b) Calculate the:
   (i) Mean.
   (ii) Standard deviation.

(CODE HIGH SCHOOL)

4. The table below shows the weight of shows the weight of seeds of a certain type of plant.

Weight(grams)	<0.10	<0.25	<0.35	<0.50	<0.60	<0.65	<0.80
frequency	2	3	5	9	3	2	3

(a) Calculate the;

(i) Standard deviation.

(ii) Number of seedling that weigh more 0.57g.

(b) Draw a histogram and use it to estimate the modal weight.

(ST MICHEAL SONDE)

5. The table below shows the weights to the nearest kg of 150 patients who visited health unit during a certain week.

Weight (kg)	0-19	20-29	30-39	40-44	45-59	60-64	65-79
No. of patients	30	16	24	32	28	12	8

(a) Calculate the approximate;

(i) Mean.

(ii) Modal weights for the patients.

(b) Plot an O-give for the data. Use the O-give to estimate;

(i) Median.

(ii) Probability that patients weighing between 13 and 52 kg visited the health unit.

(WHITE ANGELS HIGH SCHOOL)

PROBABILITY

6. The probabilities of events A and B are $P(A) and P(B)$ respectively. $P(A) = \frac{5}{12}, P(A \cap B) = \frac{1}{6}$ and $P(A \cup B) = q$. Find in terms of q,

(i) $P(B)$

(ii) $P(A/B)$

(iii)   Given that A and B are independent, find the value of q.

(b) A box contains 8 green and 4 red apples. Five apples are selected at random from the box in succession without replacement. What is the probability that three of them are green?

(JINJA PROGRESSIVE)

7. (a) A continuous random variable X has a probability density function f given by;

$$f(x) = \begin{cases} \dfrac{k}{x(4-x)} & 1 \le x \le 3 \\ f(x) = 0 & otherwise \end{cases}$$

(i) Show that $k = \frac{2}{In\ 3}$.

(ii) Calculate the mean and the variance of X

(b) The probability density function of a random variable X is given by;

$$f(x) = \begin{cases} c(x + 2), & -1 \leq x \leq 0 \\ 2c(1 - x), & 0 \leq x \leq 2 \\ 0, & elsewhere \end{cases}$$

(i)   Sketch $f(x)$ and find the value of c
(ii) Find the probability $P(|x - 1| < 0.5)$

(ST CHARLES LWANGA BUKERERE)

8. During an epidemic of a certain disease, a doctor was consulted by 110 people of which 45 were female. Of those who consulted, 20 female and 15 males actually had the disease and among these 18 females and 3 males accepted to be treated while those that didn't have the disease didn't require any treatment. Find the probability that a person chosen at random.

(i)   Had the disease.
(ii)   Was treated.
(iii) Is male given that he was treated.

(WAKISO HILLS)

9. (a) Metal rods produced by a machine have lengths that are normally distributed. 20% of the rods are rejected for being shorter than the minimum acceptable length of 35mm. Given that 65% of the metal rods produced are between 35mm and 45mm;

(i)   Calculate the mean and variance of the lengths of the metal rods produced.
(ii)   If 10 rods are chosen at random from a batch produced by the machine, find the that at least one of them has a length greater than 40mm.

(b) A certain tribe is distinguished by the fact that 45% of the males have six toes on their right foot. Find the probability that in a group of 200 males from the tribe, more than 97 have six toes on their right foot.

(c) The heights students in a particular school are distributed with mean μ and standard deviationσ. On the basis of the results obtained from a random sample of 100 students from the school the 95% confidence interval for the μ was calculated and found to be [177.22cm, 179.18cm]. Calculate the value of the sample mean $\bar{x}$ and value of σ.

(TALENTS COLLEGE)

10. (a) Two tetrahedral dice each with four faces numbered 1 to 4 inclusive are tossed at once. If the random variable S represent the sum of the scores on the faces on which the dice lands on.

(i)   Generate a probability distribution for S
(ii)   Sketch the p.d.f f(s) and determine the expected value.

(b) In a game, a player pays Ugx 5000 to toss three coins biased in such way that they are twice as likely to show a head than a tail. Depending on the number of tails he obtains, he receives a sum of money as shown in the table below;

Number of tails	0	1	2	3
Sum received (Ugx)	1000	3000	6000	10000

(i)   Calculate the player's expected gain or loss over 12 games.

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(OLAM)

NUMERICAL METHODS

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11. (a) Use trapezium rule with seven ordinates to estimate the area bounded by the curve $xy = 12$ and the $x - axis\ from\ x = 1\ to\ x = 4$

(b) Find the exact area under the curve in (a)

(c)(i) Find the percentage error in your estimation.

(ii) How can this error be reduced?

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(ST JAMES BUDDO)

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12. (a) Wear test on 100 components gave the following grouped frequency distribution of the life length.

Life length (x hours)	Number of components
500≤x<530	15
530≤x<550	24
550≤x<570	33
570≤x<600	21
600≤x<650	7

Use linear interpolation to estimate the probability that a component drawn at random from the 100 has a life length between 540 and 580 hours.

(b) The duration of 60 telephone calls are summarized in the table below.

Duration(minutes)	0-	9-	18-	27-	36-	45-
Number of calls	6	10	21	20	3	0

Use linear interpolation to estimate the probability that the duration of a call, selected at random from the 60 calls, exceeds 30 minutes.

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(ST JOHNS NTEBETEBE)

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13. (a) Given that A=3.3366, B=0.559 round off to given accuracy, find the interval with in which the exact value of $\frac{B-A}{AB}$ is expected to lie. Give your answer to 3 decimal places

(b) The period of a simple pendulum (T) is given by $2\pi\sqrt{\frac{l}{g}}$ where π and g are constants. Given that the percentage increase in the length (l) is 4%. Find the percentage increase in the period (T)

<div align="center">(PRIDE COLLEGE)</div>

14. On the same pair of axes, draw graphs of $y = xe^{-x}$ and $y = 2x - 5$ for the interval $0 \le x \le 4$. Use your graphs and locate the root to 1 decimal place of the root $xe^{-x} - 2x + 5 = 0$ hence use the Newton Rasphon method and find the root of the equation, correct to two decimal places.

<div align="center">(PAUL MUKASA)</div>

15 (a) The dimension of a rectangular plot are 1.25km and 0.44km. if the length and width have 5% and 4.2% error respectively in the estimates. Calculate the limits with in which the area of the plot lies correct to two significant figures.

(b) The height and radius of a cylinder are measured as h and r with maximum possible errors Δ_1 and Δ_2 respectively. Show that the maximum percentage error made in calculating the volume is $\left(\left|\frac{\Delta_1}{h}\right| + 2\left|\frac{\Delta_2}{r}\right|\right) x100$.

<div align="center">(NAMRUTH HIGH SCHOOL MUKONO)</div>

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MECHANICS

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16. The position vector of a particle of mass 4kg at time t is given by $r = \left(cost\tilde{i} + sint\tilde{j} + \frac{1}{2}t^2\tilde{k}\right) m$. find the;

    (i) Kinetic energy at time t.
    (ii) Power exerted by the force at time t
    (iii) Work done by the force between t=0 and t=4s

<div align="center">(GAYAZA ROAD TRIANGLE KIWENDA)</div>

17. A ship, A is travelling on a course of 060^0 at speed of $30\sqrt{3}kmh^{-1}$ and ship B is travelling on a course of 030^0 at $20kmh^{-1}$. At noon, B is 260km due east of A. Calculate the least distance between A and B to the nearest kilometer and the time taken for this to happen.

<div align="center">(MENTHA HIGH SCHOOL)</div>

18. (a) A uniform rests in limiting with its top end against a smooth vertical wall and its base on a rough horizontal floor (coefficient of friction μ). If the ladder makes an angle of θ ,prove that $2\mu tan\theta = 1$

(b) A non- uniform ladder AB of length 6m has its center of gravity at a point C on the ladder such that AC=4m. The ladder rests in limiting equilibrium with end A on rough horizontal ground of coefficient of friction $\frac{1}{3}$ and end B against a rough vertical wall of coefficient of friction $\frac{1}{4}$. If the ladder makes an a cute angle θ with the ground, show that $tan\theta = \frac{23}{12}$.
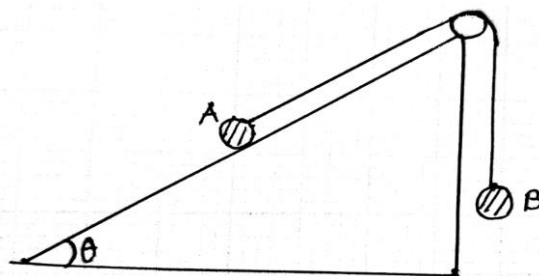
19. (a) A particle B of mass m kg keeps Particle A of mass 10kg at rest on rough inclined plane of angle $= \tan^{-1}\frac{4}{3}$. If the coefficient of friction of friction between A and inclined plane is 0.5, calculate the minimum and maximum values of m.

(b) If the mass of A is doubled, calculate the magnitude of the accelerations of the particles.

20. (a) A projectile is released with speed u at an angle of elevation θ to the horizontal, it just clears two obstacles both of height **h** m whose distances from the projection point are **b** m and **3b** m respectively. Show that the range of the projectile is **4b** m

(b) The maximum range of a projectile, fired with speed **u** is**R.** A target is placed **h**m above the landing point. Show that the speed with which it must be projected if it is to hit the target without changing the angle of projection is $\dfrac{u^2}{\sqrt{u^2-gh}}$

END