1. Given that $\log_2 128^x = 1/\sqrt{3}$.find the value of x.

b) Given that $\frac{1}{\sqrt{2}} - \frac{\sqrt{2}+1}{1+3\sqrt{2}} = a\sqrt{2} + b$.

c) Show that $\frac{2a.b.a+a.a.a+b.b.b}{ab\,(a+3b)} = \frac{2+11\sqrt{2}}{14}$. When $a=b\sqrt{2}$.

2.a The roots of the equation $2x^2-6x+7=0$ are α and β. Determine the:

(i) values of $(\alpha-\beta)^2$ and $\frac{1}{\alpha^2\beta} + \frac{1}{\alpha\beta^2}$

(ii)quadratic equation with integral coefficient whose roots are$(\alpha-\beta)^2$ and $\frac{1}{\alpha^2\beta} + \frac{1}{\alpha\beta^2}$.

b. The remainder obtained when$3x^3-6x^2+$**p**x-1 is divided by (x+1) is equal to the remainder obtained when the same expression is divided by (x+3).find the value of **p**

3. The following table shows the milk production in litres of a diary farm in each quarter of the years 2012, 2013 and 2014.

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
2012	2490	3640	5015	1480
2013	2360	3520	4890	1375
2014	2155	3265	4630	1170

(a) Calculate the four point moving averages.

(b)(i) On the same axes, plot and draw graphs of the original data and the four point moving averages .

(ii)comment on the trend of milk production.

c)use your graph in b)to estimate the amount of milk produced by the farm in the 1stquarter of 2015.

4. Ten students scored the pair of marks in economics and mathematics as follows .
A(62,75) B(54,58) C(46,46) D(34,37) E(54,37) F(36,45) G(24,11) H(17,22) I(47,49) and K(70,70)

a)i)draw a scatter diagram of economics (x) against mathematics (y).

ii)draw a line of best fit and estimate the score in mathematics for a student who scored 52 in economic

b) calculate the rank correction coefficient between the score of economics and mathematics and hence comment on your result.

5. The data below shows marks obtained by 50students in a test.

7.6	1.7	5.7	6.3	1.2	9.6	3.8	4.6	8.2	4.8
6.1	9.3	4.4	19	7.0	6.0	7.1	1.8	4.0	5.4
5.0	2.7	6.2	4.2	6.3	5.2	5.3	3.8	6.2	2.5
6.2	2.3	3.2	8.1	3.1	6.3	6.4	1.8	7.0	2.7
5.2	8.1	3.5	6.3	3.8	3.7	4.4	1.9	7.0	3.2

a)construct a grouped frequency distribution .

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

c) Calculate the mean and standard deviation of the marks.

6)The table below shows the weights of 52 students in kgs.

Weights	Cumulative frequency
40-	3
45-	5
50-	12
55-	30
60-	48
65-	51
70-74	52

a)calculate the:

i)mean weight

ii)variance of their weights.

b)draw a cumulative frequency curve and estimate:

i)median

ii)number of students whose weights exceed 58kg.

7. Find the values of X and Y by solving the following simultaneous equations : a) $5X^2 + 3y = 6$, $3X^2 + 9Y = 12$.

b) $2Y - X = 1$, $3Y + X^2 = 1$.

c) $2X + y = 1$, $5X^2 + 2XY = 2X + Y - 1$.

d) $X + 2Y = 1$, $3X^2 + 5XY - 2Y^2 = 10$.

e) $2X - 2Y = 1$, $X^2 - XY - 4 = 0$.

f) $5^{x+2} + 7^{y+1} = 3468$, $5^x - 7^y = 76$.

8(a). The rate of motarity of women (rate at which women are dying) is directlr propotional to the number of women dying at a given time t in years.Given that initially 20 women were dying and after 4 years it reduced to 10 women dying If N is number of women dying at any time t,and A is proportionality constant,

(i)Form a differential equation connecting N,t and A

(ii)Solve the differential equation formed in (i) above

(iii)Find the time taken for the number of women dying to be reduced to 5 women

(b) Solve the differential equation:$\frac{dy}{dx}$ +5=6x,given that when x=1,y=2.

9(a). Use matrix to solve the simultaneous equations

8x-y=6

3x+2y=26

(b) Mukisa ordered for the following items from a shop;2kg of sugar,3bars of soap and 1 packet of tea leaves. And Okello ordered for 4kg of sugar ,1 bar of soap and 2 packets of tea leaves. If the cost of sugar is shs.2500 per kg,soap shs.2100 abar and tea leaves shs.1200 a packet .

(i)Form a matrix of order 2x3 for the items ordered

(ii)Form a matrix of order 3x1 for the cost of items

(iii) By matrix multiplication find the bills paid by each person.

(c) A family bought the following items for three successive days.The first day it bought three banches of matooke,two kgs of rice ,five kgs of meat and two kgs of sugar.The second day it bought only one kg of sugar.The third day the family bought a bunch of matooke and two kgs of rice.Abunch of matooke costs shs.15000.A kilogram of rice,meat and sugar cost shs.3300,shs8000 and shs3000 respectively.

(i)Represent the family's requirements in a 3x4 matrix.

(ii)Write down the cost of each item as column matrix

(iii)Use the matrices in b(i) and(ii) to find the family's total expenditure for the three days.

10 (a). A car initially at rest accelerated uniformly to a speed of 20 ms^{-1} in 16 seconds. The car then travelled at attained speed for 2 minutes. The car then accelerated uniformly at 2.5 ms^{-2} for 2 seconds. It finally decelerated uniformly at 2.5 ms^{-2} to rest.

Find the;

(i) Greatest speed attained by the car.

(ii) Total time taken by the car to come to rest.

(iii) Sketch the velocity-time graph for the motion of the car.

(iv) Use your graph to find the total distance travelled by the car.

(b) A motorist moving at 90kmh^{-1} decelerates uniformly to a velocity V ms^{-1} in 10 seconds. He maintains this speed for 30 seconds and then decelerates uniformly to rest in 20 seconds.

(i) Sketch a velocity-time graph for the motion of the motorist.

(ii) Given that the total distance travelled is 800m, Use your graph to calculate the value of V.

(iii) Determine the two decelerations.

11. (a). If $\boldsymbol{OA} = \begin{pmatrix}6\\5\end{pmatrix}$, $\boldsymbol{OB} = \begin{pmatrix}9\\2\end{pmatrix}$and $\boldsymbol{OC} = \begin{pmatrix}7\\0\end{pmatrix}$,

Find the vectors;

(i) $\boldsymbol{BC}$.

(ii) $\boldsymbol{AB}$.

(iii) Show that the vectors $\boldsymbol{AB}$ and $\boldsymbol{BC}$ are perpendicular.

(iv) Determine the magnitude of the vector $\boldsymbol{2BC - 3AB}$.

(b) Given that $\boldsymbol{a} = \boldsymbol{2i} + \boldsymbol{j}$ and $\boldsymbol{b} = \boldsymbol{3i} - \boldsymbol{4j}$ and $\boldsymbol{c} = \boldsymbol{2a} + \boldsymbol{b}$. Find;

(i) Vector $\boldsymbol{C}$.

(ii) Modulus of vector $\boldsymbol{C}$.

12. a Events A,B and c are such that P (A) =$^2/_7$, P(B)=$^3/_8$ and P(C)=$^3/_5$. Given that A and C are independent events and B and C are mutually exclusive events find;

(i) P(AUC)

(ii) P(BUC)3

(b) A bag contains 30 White(W), 20 blue(B) and 20 red(R) balls. Three balls are drawn at random one after the other with out replacement. Determine the probability that the first ball is white and the third ball is also white.

(c) Events C and D are such as that P(C) = $\frac{4}{7}$,P(CnD)' =$\frac{1}{3}$ and P($^{C}/_{D}$)=$\frac{5}{14}$.Find;

(i) P(D)

(ii) P(C'n D')

(d) Two events A and B are such that P(A) =$\frac{1}{5}$ and P(B)=$\frac{1}{2}$. Find P(AuB) when A and B are;

(a) Independent events,

(b) Mutually exclusive events.

(e) Two independent events E_1 and E_2 are such that P(E_1)=0.40 P(E_2) =a, P(E_1uE_2)=0.70.

Find

(i) P(E_1uE_2)'

(ii) The value of a

(iii) P(E_1nE_2)

(iv) P(E_1nE_2')

(13) a. Given that A and B are obtuse angles such that $\sin B = \frac{4}{5}$ and $\cos A = \frac{5}{17}$, with out using tables or calculators find the value of

(i) $\sin(A + B) - \cos A - B)$

(ii) $\tan {}^{B}/_{2}$.

(b) Given that $\sin 45° = \frac{1}{\sqrt{2}}$ Show that the value of $\tan 135° = {}^{-}1$.

(c) If $\sin Q = \frac{^{-}3}{5}$ and $\cos x = \frac{^{-}12}{13}$, Then angle Θ and angle α lie in the same quadrant. With out using tables or calculators evaluate $\cos(\Theta + \alpha)$.

(d) If $\sin \Theta = \frac{3}{5}$ and A is obtuse, and $\tan B = \frac{^{-}7}{24}$ and B is a cute. Find without using tables, the value of $\tan(A + B)$.

(e) Eliminate Θfrom the equations.

(i) $x + \cos \Theta and\ y = 2 \tan \Theta$

(ii) $x = \sin \Theta, y = \cos 2\Theta$

(iii) $x = 1 - \tan Q\ and\ y = \sec \Theta$

13. The function $y = ax^3 + bx^2 + c$ has turning points at (0 , 4) and($^{-}$1 , 5)

(i) Find the value of a , b and c.

(ii) Sketch the curve of the function.

14. The equation of the curve is $y - 3x^2 = 2$.

(i) Determine the turning point of the curve.

(ii) Find the nature of the turning point.

(iii) Sketch the graph of the curve.

(b) Calculate the area of the region enclosed by between the line $2y = 28$ and the curve $y - 3x^2 = 2$.

15. The equation of a curve is $x^2 - 2x = 3 - y$.

(a) Determine the;

(i) Coordinates and nature of the turning point of the curve.

(ii)$y - and\ x -$ intercept of the curve.

(b) (i) Sketch the curve.

(ii)Find the area enclosed by the curve and the x –axis.

END