MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2022/2023

SCHOOL OF PURE APPLIED AND HEALTH SCIENCES

BACHELOR'S OF SCIENCE APPLIED STATISTICS WITH COMPING AND

BACHELOR'S OF SCIENCE MATHEMATICS

FIRST YEAR SECOND SEMESTER

COURSE CODE: STA 1209-1

COURSE TITLE: Computing Methods I

DATE: **TIME:**

INSTRUCTIONS:
Attempt Question one and any other Two Questions

Question One

a. Determine the results of the following computations in R.
   i. 5327/(45 + 34). **(1 mark)**
   ii. (12 + 60) < = (73). **(1 mark)**
   iii. 73%%9. **(1 mark)**
   iv. (125%%8)>3. **(1 mark)**
   v. (71%%6) < = (65%%11). **(1 mark)**

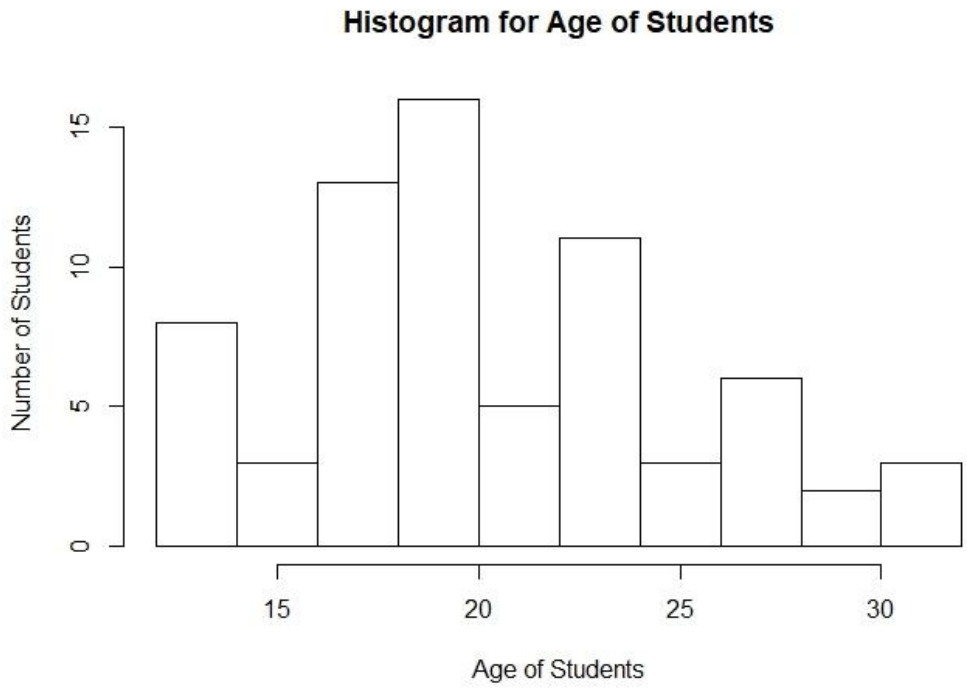
b. Four vectors were defined as follows;

```
v=c(23,45,67,12,67,8,90)
x=c(4L,5L,8L,2L,6L,5L)
y=c("John",45,6L,"Samwel",34,5L)
s=c(4i,6i,5L,7L,56,32)
```

Determine the appropriate class for the vectors v, x, y and s. **(4 marks)**

c. Write an R function that will be used to compute the volume of any cylinder given the diameter and height of cylinder. **(4 marks)**

d. The figure below shows the distribution of student ages. Use it to answer the questions that follows;



   i. Using the variables **"Age"** write an R code that was used to construct the figure. **(3 marks)**
   ii. Describe the distribution of the student age based on the plot. **(2 marks)**
   iii. State the best measure of central tendency and dispersion for the student Age. **(2 marks)**

Question Two

The extract below shows the first five observations of the data set **Students** use it to answer the questions that follows.

```
##     ID Age Gender Weight Height Balance
## 1 7830  15      1     17   1.55    2614
## 2 3833  22      1     40   2.33    2533
## 3 5757  26      1     88   1.18    2571
## 4 2623  13      1     71   2.00    2589
## 5  741  22      1    114   2.71    2570
## 6 6173  19      1     93   1.52    2601
```

Write R codes that will be used to do the following on the data set.

a. Create a variable **Gender2** which has the actual values of the variable Gender such that $(Male = 1, Female = 0)$. **(2 marks)**

b. Create a variable **BMI** which is given by the formula $\left(BMI = \frac{Weight}{Height^2}\right)$. **(2 marks)**

c. Code the variable into **Age_Group** such that $(Age < 19 = Teenager, 19 \leq Age \leq 35 = Youth, 36 \leq Age \leq 59 = MiddleAge, Age \geq 60 = Retired)$. **(3 marks)**

d. Filter out male students who have a fee balance of above 2500. **(2 marks)**

e. Filter out Female students who are aged above 23 years and weigh less than 60 kg. **(2 marks)**

f. Construct a boxplot for Age based on different gender. **(2 marks)**

g. Plot a pie chart for **"Gender2".** **(2 marks)**

Question Three

a. Discuss the three control structures used in programming. **(6 marks)**

b. Write the code for an R function that will accept coefficients of a quadratic equation as parameters then use the coefficients to determine the roots of the quadratic equation. **(5 marks)**

c. Write code for an R function used in computing the surface area of an open cone. **(4 marks)**

Question Four

a. Below is a system of linear equation. Write down a sequence of R code that would be used to solve the linear system of equations using matrix algebra. **(6 marks)**

$$2x + 3y - 4z + 6w = 180$$
$$x + 14y + 2z - 3w = 236$$
$$9x - 2y - 3z + 12w = 350$$
$$7x + y + 3z - 8w = 45$$

b. Let X be a random variable with probability density function.

$$f(x) = \begin{cases} 0.2e^{-0.2x} & x > 0 \\ 0 & otherwise \end{cases}$$

Write down an R function that can simulate n values of X. **(6 marks)**

c. Write an R code that would be used to generate squares of even numbers between 100 and 200 inclusive starting with the square of 200. **(3 marks)**