ID NUMBER.....

DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE

ACTU 302: INTRODUCTION TO ACTUARIAL COMPUTING (3 CREDITS)

INTERIM ASSESSMENT: 2022/2023

INSTRUCTIONS: ANSWER ALL QUESTIONS

- **Create a folder on desktop and name it *ACTU302_2023_ID*. For example, a student with identity number (ID), 10070848, will name his/her folder: *ACTU302_2023_10070848*.**
- **For each question, you are required to provide your R codes and your results. Only a few results must be displayed as an illustration of your R codes to limit the number of pages for your work.**
- **Use Microsoft Word to organise your work and save it in BOTH MS Word and PDF format with your ID number as the file name. For example, a student with ID number 10070848 will have his/her files named: ACTU302_10070848. Upload these two files on SAKAI.**
- **Please adhere to these instructions to have your work properly submitted for marking**

TIME ALLOWED: $1\frac{1}{2}$ HOURS

The `MASS` package in R contains the `Aids2` data. Use this data set to answer the following questions

1. Use the help files to describe this data, and identify the data structure and type.

2. From your identified data types for the variables, select one variable from each distinct data type and choose appropriate descriptive statistics to describe each of the selected variable. Comment on your results.

3. Randomly select 1000 observations from this data. Provide your R code and show the first few observations of your sampled data.

4. Compute the survival time of Aids patient and name it as a new variable called "Survival". Attach this to the selected sample in a new data frame.

ID NUMBER..... SIGNATURE.....

5. Compare the survival times according to the status of `status` of the patients. Comment on your results.

6. Plot a histogram of the survival time for the whole sampled data. Use relative frequencies.

7. It has been suggested that a normal and the exponential distributions can be fitted to the survival times through the maximum likelihood estimation method. Write functions in R to compute the estimates of the parameters of the two distributions and use them to estimate the parameters of the survival time of patients.

8. From your results in (6) and (7) or otherwise, superimpose the density function of the normal and exponential distributions using your estimates from the maximum likelihood method. Which method gives better fit? Explain.