# MH3511 Data Analysis with Computer

## Trial Run (January 2024) AY2023/24 Semester 2

(This Trial Run will NOT be graded)

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**Question T.1**

Create the vector using functions such as seq() and rep() in R.

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| Type or paste your **R code and results** in this box.  > rep(seq(1,9, by=2),3)  [1] 1 3 5 7 9 1 3 5 7 9 1 3 5 7 9 |

**Question T.2**

The function is defined as

Write a function in R, and use it to determine the values of and .

Hints: the functions exp(y) and factorial(y) give the values of exp(y) and y!, respectively, in R.

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| Type or paste your **R code and results** in this box.  p(1;2)  > exp(-2)\*2^1/1  [1] 0.2706706  P(6;4)  > exp(-4)\* (4^6)/factorial(6)  [1] 0.1041956 |

**Question T.3**

﻿Copy and paste the following code into R to generate the dataset “ds”.

> set.seed(3511)

> datanorm <- rnorm(50, 2, 4)

> ds <- 1.1^(datanorm)

a) Make a histogram of the dataset “ds”, and overlay a normal density curve with the sample

mean and the sample standard deviation of the data. Ensure that the normal density curve

has the same area under the curve as that of the histogram.

b) Using R, make a boxplot of the dataset “ds”.

c) Using R, determine the number of possible outliers using

(i) the classical technique, and

(ii) the boxplot rule.

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| ﻿Type or paste your **R code and results** in this box.  a)  hist(ds)  xpt = seq (0.4,2.2,by=0.1)  n\_den = dnorm(xpt,mean(ds),sd(ds))  ypt= n\_den \* length(ds) \* 0.2  lines(xpt,ypt,col='blue')    b)  boxplot(ds)  A diagram of a graph  Description automatically generated  ci)  outliers <- numeric(0)  # Find outliers using your approach  for (elem in ds) {  if (elem - mean(ds) > 2 \* sd(ds)) {  outliers <- c(outliers, elem)  }  }  # Print the number of outliers found  num\_outliers <- length(outliers)  print(paste("Number of possible outliers (using classical method):", num\_outliers))  [1] "Number of possible outliers (using classical method): 2"  cii)  # Calculate quartiles and IQR  Q1 <- quantile(ds, 0.25)  Q3 <- quantile(ds, 0.75)  IQR <- Q3 - Q1  # Initialize an empty vector to store outliers  outlier <- numeric(0)  # Find outliers using the boxplot method  for(elem in ds) {  if(elem < Q1 - 1.5 \* IQR | elem > Q3 + 1.5 \* IQR) {  outlier <- c(outlier, elem)  }  }  # Print the number of outliers found  num\_outlier <- length(outlier)  print(paste("Number of possible outliers (using boxplot method):", num\_outlier))  [1] "Number of possible outliers (using boxplot method): 0" |