**INSTITUTE AND FACULTY OF ACTUARIES**

**PRE-WORK MATERIAL**

April 2021

**Subject CS2 – Risk Modelling and Survival Analysis**

**Core Principles**

**Paper B**

**INSTRUCTIONS TO THE CANDIDATES**

You are provided with this advance information to enable you to read, understand and action in your own time, and not under examination conditions.

This instruction sheet provides you with one data file for you to use in the examination:

CS2B\_Apr\_21\_Qu\_3\_Data.csv

This data file needs to be loaded into R by first saving it onto the computer you are going to be using in the examination. Once you have completed this then you need to load the data file into R ready for use during the examination.

Further guidance on how to do this can be found in “A Guide to CS1 and CS2 Examinations” on the [website](https://www.actuaries.org.uk/studying/curriculum-2019/actuarial-statistics).

The guide also provides details of the R packages that will be required for the 2021 CS2B examinations.

**PLEASE NOTE** that no prior knowledge of the copula, rpart and rpart.plot packages is required for the examination.

To test that you have successfully loaded the required R Packages run the following code in order within R:

######################################################

#### (i) Open libraries #############################

######################################################

library(copula)

library(graphics)

library(markovchain)

library(rpart)

library(rpart.plot)

library(stats)

library(survival)

library(utils)

######################################################

#### (ii) Check installs ############################

######################################################

x = c(1:10)

y = matrix(data = c(1,0,0,0,1,0,0,0,1), nrow = 3 , byrow = TRUE)

# Check base package

mean(x)

# Check copula package

fk = frankCopula(5)

persp(fk, dCopula)

# Check graphics package

plot(x)

# Check markovchain package

mc = new("markovchain", transitionMatrix = y); mc

# Check rpart package

rectree <- rpart(Mileage ~ Weight, car.test.frame)

summary(rectree)

# Check rpart.plot package

rpart.plot(rectree, digits = 3, type = 4)

# Check stats package

ppois(5, 11.668332)

# Check survival package

cipoisson(5)

# Check utils package

combn(x,10)

If the code completes with no errors the nine packages are successfully installed.

If you encounter any issues, please contact the Examinations Team on +44 (0) 1865 268 873.

**END OF PRE-WORK MATERIAL**