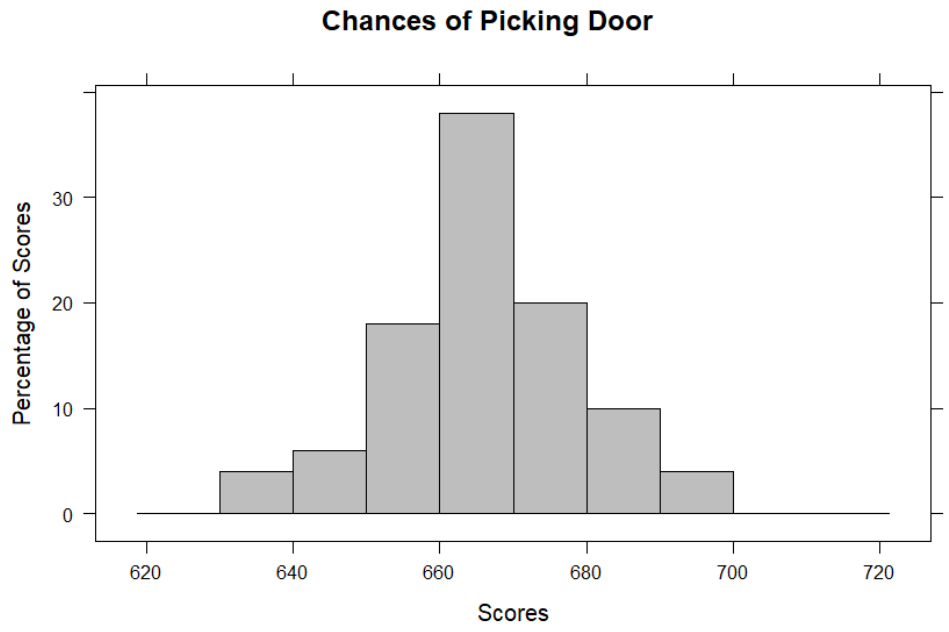
NAME: Markus Afonso Set: C

MATH 1350 **Statistics for Information Technology**

Lab # 4 – More Probability
Answer/Grading Sheet

Step:	Answer (if requested)	Mark	
7	• Modifications of the Lab 3 script to perform the Monty Hall experiment		/ 5
8	• Edit for loop and if statements to match the code snippet		/ 2
10	• Frequency histogram of 50 runs of the Monty Hall code (with requested features) – paste it here  • Which class from your frequency histogram is the mode of the frequency distribution? `breaks=seq(620,720,10)`		/ 5 / 1
11	• Mean number of wins per 1000 games: (paste it here) `[1] 667.36`		/ 1
12	• Estimate of the probability of winning the Monty Hall game if we switch doors: (answer here)		/ 2

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Step:	Answer (if requested)	Mark	
	0.6667 change of winning the game.		

R script

Paste your R script here. Make sure that it contains ALL of the elements worth points listed above.

```
# Lab 4
# Markus Afonso

library(mosaic)

doordata <- read.delim("C:/Users/Markus/OneDrive - BCIT/Desktop/Term2/MATH
1350 Statistics for IT/Week4/doordata.txt", comment.char="#")
h <- 1:50
nums <- list()
for (x in h){

n <- 1:1000
winning_door <- sample(c(1,2,3), length(n),replace=TRUE)
first_pick <- sample(c(1,2,3), length(n),replace=TRUE)
win_counter <- 0
loss_counter <- 0
for (i in n) {
  if (winning_door[i]== first_pick[i]) {
    loss_counter <- loss_counter+1
  }
  else {
    win_counter <- win_counter +1
  }
}

nums <- append(nums, list(win_counter))
}
nums <- unlist(nums, use.names = FALSE)

histogram(nums, main = "Chances of Picking Door",
          xlab = "Scores", ylab = "Percentage of Scores", type = "p",
          col="grey", breaks=seq(620,720,10))
mean(nums)
```

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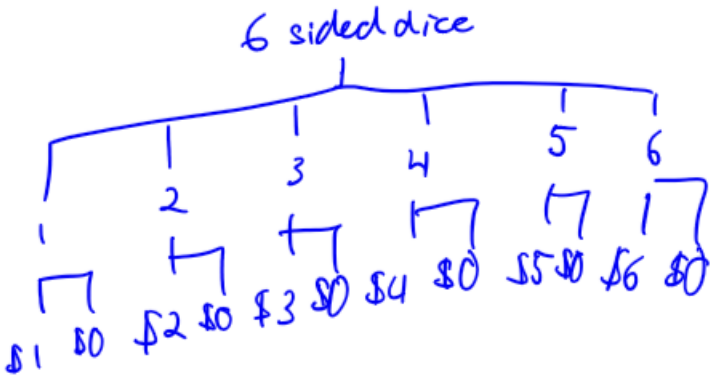
Step:	Answer (if requested)	Mark	
	Paper and Pencil problem #1 (this is just a space for your marks)		/ 3
	Paper and Pencil problem #2		/ 4



a) $\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12} =$ 0.08333 chance of winning $6.

b) $\frac{\text{total amount}}{\text{possible outcomes}}$

$$\frac{(1+2+3+4+5+6)+(0)}{12}$$

$$= \frac{21}{12}$$

$$= \$1.75$$

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Step:	Answer (if requested)	Mark	
	2) a) $n_1 \cdot n_2 \cdots \cdot n_k = n^k$ 0.25^5 $= 0.0009765$ probability that they will all pass. b) $1 - 0.25$ $= 0.75$ of failing 0.75^5 $= 0.2373$ probability at none passing c) $P(\text{at least once}) = 1 - P(\overline{S_1} \cap \overline{S_2} \cap \overline{S_3} \cap \overline{S_4} \cap \overline{S_5})$ $= 1 - (0.75)^5$ $= 0.7267$ probability at at least one passing. d) $P(3P \cap 2F) = (1-0.75)(1-0.75)(1-0.75)(1-0.25)(1-0.25)$ $0.15625 \cdot 0.5625$ $= 0.08789$		
	Paper and Pencil problem #3		/ 6

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Step:	Answer (if requested)	Mark	

3)

	EV	IS	DOS	MIM	Totals
D	26	5	51	34	116
A	115	30	104	12	261
N	32	43	19	21	115
Totals	173	78	174	67	492

a) $P(N) = \frac{115}{492}$

$= 0.2337$

b) $P(IS \cap MIM) = P(IS) \cdot P(MIM)$

$= \frac{78}{492} \cdot \frac{67}{492}$

$= 0.02158$

c) $P(MIM \cup DOS) = P(MIM) + P(DOS)$

$= \frac{67}{492} + \frac{174}{492} - 0$

$= 0.4857$

d) $P(\bar{A}) = 1 - \frac{261}{492}$

$= 0.4695$

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Step:	Answer (if requested)	Mark	
	e) $P(M \mid M \cup D) =$ $P(M \mid M) + P(D) - P(M \mid M \cap D)$ $\frac{67}{492} + \frac{116}{492} - \left(\frac{34}{116}\right)$ $\frac{183}{492} - 0.2931$ $= 0.7885$ f) $P(\overline{D} \cup \overline{EV}) = P(\overline{D}) + P(\overline{EV}) - P(\overline{D} \cap \overline{EV})$ $\left(1 - \frac{116}{492}\right) + \left(1 - \frac{173}{492}\right) - \left(1 - \frac{26}{492}\right)$ $= 0.4654$		
	Paper and Pencil problem #4		/ 3

NAME & Set: _____

Step:	Answer (if requested)	Mark	
	4/5 4) 1/5 1/5 1/5 1/5 1/5 1/5 1/5 1/5 1/5 1/5 4/5 - 2/5 = 2/5 - chance of winning 1/5 chance of winning without switching 5) yes, always		

Total /32