Home Work #3

Question 4.8

Solutions:

Part a)
THE PROBABILITY OF A RANDOMLY SELECTED CAR HAVING NO FAULTY LIGHTS IS 70%

Part b)
THE PROBABILITY OF A RANDOMLY SELECTED CAR HAVING AT MOST ONE FAULTY LIGHTIS 85%

Part c)
THE PROBABILITY OF A RANDOMLY SELECTED CAR HAVING AT LEAST ONE FAULTY LIGHT IS 30%

Code:

```
one_faulty_light <- 0.15
two_faulty_lights <- 0.10
three_faulty_lights <- 0.05

# Part a)
no_faulty_lights <- (1 - one_faulty_light - two_faulty_lights - three_faulty_lights) * 100
print(no_faulty_lights)

# Part b)
maximum_one_faulty_light <- (1 - one_faulty_light) * 100
print(maximum_one_faulty_light)

# Part c)
minimum_one_faulty_light <- (one_faulty_light + two_faulty_lights + three_faulty_lights) * 100
print(minimum_one_faulty_light)
```

Question 4.17

Solutions:

Part a)
THE PROBABILITY OF A RANDOMLY SELECTED M&M IS BROWN IS 15%

Part b)
THE PROBABILITY OF A RANDOMLY SELECTED M&M IS RED OR GREEN IS 25%

Part c)
THE PROBABILITY OF A RANDOMLY SELECTED M&M IS BOTH RED AND BROWN IN 0%. A SINGLE SAMPLE IN THIS STUDY CANNOT BE TWO COLORS

Code:

```
yellow <- 0.15
red <- 0.10
orange <- 0.20
blue <- 0.25
green <- 0.15
brown <- 0.15

# Part a)
chance_brown <- brown * 100
print(chance_brown)

# Part b)
chance_brown_green <- (brown + green) * 100
print(chance_brown_green)

# Part c)
chance_not_blue <- (1 - blue) * 100
print(chance_not_blue)
```

Question 4.21

Solutions:

Part b)
THE PROBABLITY OF OCCURANCE THAT A DONOR WILL BE WHITE WITH TYPE-O BLOOD IS 44.88778%

Part c)
THE PROBABILITY A DONOR WILL HAVE TYPE-O BLOOD IS 46.2%. BECAUSE THE PROBABILITY OF THESE TWO EVENTS ARE DIFFERENT THEY ARE NOT INDEPENDANT

Part d)
THE EVENT OF A DONOR BEING WHITE AND HAVING TYPE-O BLOOD ARE NOT MUTUALLY EXLUSIVE

Code:

```
 # Part b)
prob_white_typeO <- (0.36 / (0.36 + 0.322 + 0.088 + 0.032)) * 100
print(prob_white_typeO)

# Part c)
prob_typeO <- (0.36 + 0.07 + 0.017 + 0.015) * 100
print(prob_typeO)
```

Question 4.23

Solutions:

Part a)
THE PROBABILITY A RANDOMLY SELECTED GOVERNMENT EMPLOYEE WITH AN ADVANCED COLLEGE DEGREE ACCEPTS A PROMOTION IS 74.3%

Part b)
THE PROBABILITY A RANDOMLY SELECTED GOVERNMENT EMPLOYEE WITH AN ADVANCED COLLEGE DEGREE DOES NOT ACCEPT A PROMOTION IS 25.7%

Part c)
THE PROBABILITY THAT A RANDOMLY SELECTED GOVERNMENT EMPLOYEE HAVING AN ADVANCED COLLEGE DEGREE HAS A SPOUSE WITH A PROFESSIONAL POSITION IS 46%

Code:

```
 # Part a)
prob_accept <- (743 / 1000) * 100
print(prob_accept)

# Part b)
prob_reject <- (257 / 1000) * 100
print(prob_reject)

# Part c)
prob_professional_spouse <- (460 / 1000) * 100
print(prob_professional_spouse)
```

Question 4.41

Solutions:

Part a)
THE PROBABLITY A CUSTOMER WILL RECALL THE CENTER MORE THAN THREE TIMES IS 10.2%

Part b)
THE PROBABLITY A CUSTOMER WILL RECALL THE CENTER AT LEAST TWO TIME BUT LESS THAN FIVE TIMES IS 58.2%

Part c)
THE PROBABLITY A CUSTOMER WILL RECALL THE CENTER MORE THAN FOUR TIMES IS 3.5%

Code:

```
# Part a)
prob_three_more <- (0.067 + 0.021 + 0.014) * 100
print(prob_three_more)

# Part b)
prob_two_through_four <- (0.354 + 0.161 + 0.067) * 100
print(prob_two_through_four)

# Part c)
prob_four_more <- (0.021 + 0.014) * 100
print(prob_four_more)
```

Question 4.49

Solutions:

Part a)
PROBABILITY IS 9.022352%

Part b)
PROBABILITY IS 18.88123%

Part c)
PROBABILITY IS 5.265302%

Part d) PROBABILITY IS 72.17882%

Code:

```
poisson_prob <- function(y, mu) {
    prob <- ((mu^y) * exp(-1 * mu)) / factorial(y)
    return(prob)
    }

# Part a)
y <- 4
mu <- 2
prob <- poisson_prob(y,mu) * 100
print(prob)

# Part b)
y <- 4
mu <- 3.5
prob <- poisson_prob(y,mu) * 100
print(prob)

# Part c)
y <- c(0,1,2,3,4)
mu <- 2
prob <- poisson_prob(y,mu) * 100
prob <- 100 - sum(prob)
print(prob)

# Part d)
y <- c(1,2,3)
mu <- 2
prob <- poisson_prob(y,mu) * 100
prob <- sum(prob)
print(prob)
```

Question 4.50

Solutions:

Part a)
PROBABILITY IS 0.2478752

Part b)
PROBABILITY IS 39.36972%

Part c)
PROBABILITY IS 15.12039%

Code:

```
 poisson_prob <- function(c, mu) {
    prob <- ((mu^c) * exp(-1 * mu)) / factorial(c)
    return(prob)
    }

# Part a)
c <- 0
mu <- 6
prob <- poisson_prob(c, mu) * 100
print(prob)

# Part b)
c <- c(0,1,2,3,4,5,6)
mu <- 6
prob <- poisson_prob(c,mu) * 100
prob <- 100 - sum(prob)
print(prob)

# Part c)
c <- c(0,1,2,3)
mu <- 6
prob <- poisson_prob(c,mu) * 100
prob <- sum(prob)
print(prob)
```