

SEC 1-FA3 GROUP 7-DELA ROSA, R

Github Link:

https://github.com/rddelarosa/APM1110/blob/main/FA3/SEC_1-FA3_GROUP_7-DELA-ROSA%2C-R.md?plain=1

Roland Dela Rosa

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2. A binary communication channel carries data as one of two sets of signals denoted by 0 and 1. Owing to noise, a transmitted 0 is sometimes received as a 1, and a transmitted 1 is sometimes received as a 0. For a given channel, it can be assumed that a transmitted 0 is correctly received with probability 0.95, and a transmitted 1 is correctly received with probability 0.75. Also, 70% of all messages are transmitted as a 0. If a signal is sent, determine the probability that:

```
P_0 <- 0.70
P_1 <- 0.30
P_00 <- 0.95
P_11 <- 0.75
P_10 <- 1 - P_00
P_01 <- 1 - P_11
```

(a) Probability of receiving a 1.

```
P_R1 <- (P_0 * P_10) + (P_1 * P_11)
P_R1
```

```
## [1] 0.26
```

(b) a 1 was transmitted given than a 1 was received.

```
P_T1_R1 <- (P_1 * P_11) / P_R1
P_T1_R1
```

```
## [1] 0.8653846
```

7. There are three employees working at an IT company: Jane, Amy, and Ava, doing 10%, 30%, and 60% of the programming, respectively. 8% of Jane's work, 5% of Amy's work, and just 1% of Ava's work is in error.

```
P_Jane <- 0.10
P_Amy <- 0.30
P_Ava <- 0.60
P_E_Jane <- 0.08
P_E_Amy <- 0.05
P_E_Ava <- 0.01
```

(a) What is the overall percentage of error?

```
P_Error <- (P_Jane * P_E_Jane) + (P_Amy * P_E_Amy) + (P_Ava * P_E_Ava)
cat("Overall Error Probability:", P_Error, "\n")
```

```
## Overall Error Probability: 0.029
```

```
cat("Overall Error Percentage:", P_Error * 100, "%\n")
```

```
## Overall Error Percentage: 2.9 %
```

(b) If a program is found with an error, who is the most likely person to have written it?

```
employee <- c("Jane", "Amy", "Ava")

P_Jane_Most_E <- (P_Jane * P_E_Jane) / P_Error
P_Amy_Most_E <- (P_Amy * P_E_Amy) / P_Error
P_Ava_Most_E <- (P_Ava * P_E_Ava) / P_Error

P_Most_E_employees <- c(P_Jane_Most_E, P_Amy_Most_E, P_Ava_Most_E)

most_likely <- which.max(P_Most_E_employees)
most_likely_employee <- employee[most_likely]
most_likely_prob <- P_Most_E_employees [most_likely]

E_table <- data.frame(
  Employee = employee,
  Probability_Error = c(P_Jane_Most_E, P_Amy_Most_E, P_Ava_Most_E)
)

print(E_table)
```

```
## Employee Probability_Error
## 1 Jane 0.2758621
## 2 Amy 0.5172414
## 3 Ava 0.2068966
```

```
cat("Most likely employee responsible for an error:", most_likely_employee, "\n")
```

```
## Most likely employee responsible for an error: Amy
```

```
cat("The probability:", most_likely_prob, "\n")
```

```
## The probability: 0.5172414
```