

**ΕΘΝΙΚΟ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ**

ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ «ΕΦΑΡΜΟΣΜΕΝΗΣ ΟΙΚΟΝΟΜΙΚΗΣ ΚΑΙ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ»

ΚΑΤΕΥΘΥΝΣΗ

## «ΔΙΟΙΚΗΣΗ, ΑΝΑΛΥΤΙΚΗ ΚΑΙ ΠΛΗΡΟΦΟΡΙΑΚΑ ΣΥΣΤΗΜΑΤΑ ΕΠΙΧΕΙΡΗΣΕΩΝ»

Master of Science in

Business Administration, Analytics and Information Systems

**Data Analysis (Business Statistics) - Optimization**

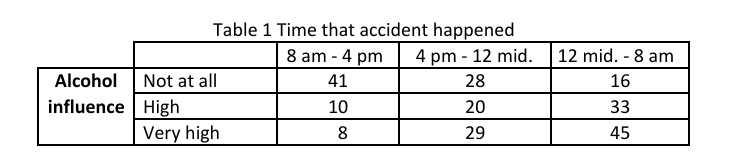
**Assignment 3:**

**Probabilities Exercises**

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Exercise 1



**Α1. Calculate the probabilities that a car accident:**

1. *happened between 8 am and 4 pm (A) :*

1. *happened subject to high alcohol influence (B) :*
2. *happened subject to very high alcohol influence (C) given that it happened between 4 pm - 12 mid. (D):*

*(iv) happened between 12 mid. - 8 am (E) given that the driver did not operate subject to*

*alcohol influence (F) :*

1. *is due to high alcohol influence (G) or happened between 12 mid. - 8 am (H):*

**Α2. Are the very high alcohol influence (A) and the chance of a car accident between 12 mid. - 8 am (B) independent events?**

In order for A and B to be independent events the following must be true:

So lets calculate:

*So =>* ***A and B are******not independent***

**Β. TOYS Company produces toys. After a quality control on produced toys, the company has**

**found that the probability of a defective product is 3%. The quality control department**

**installed a diagnostic machine in the production line that**

* **identifies defective toys with probability 98%**
* **decides wrongly that a toy is defective with probability 0.1%**

According to the statement we define the events:

A: toy is defective

A’: toy is not defective (compliment of A),

B: diagnostic machine decides defectiveness

B’: diagnostic machine decides non defectiveness.

The data now translates to :

* P(A) = 3% (P(A’) = 97%)
* P(B|A) = 98%
* P(B|A’) = 0.1%

*(i) If a toy is selected randomly, what is the probability that the diagnostic machine decides*

*defectiveness?*

*(ii) What is the probability that the toy is defective while the diagnostic machine decides*

*that it is not?*

EXERCISE 2

***1. What is the probability of being born on Wednesday;*** 1/7

***2. What is the probability that the Athens Stock Exchange will be open for business on***

***Christmas day this year?*** 0 , experimental probability

***3. What is the probability that the price of gasoline will be higher next year than this year?***

***How did you arrive at your answer?*** subjective probability

***4. What is the probability of throwing exactly 7 with two dice?*** 6/36 (from dice rolling table)

***5. What is the probability that the difference between the numbers showing when two***

***dice are rolled is 2?*** 8/36 (from dice rolling table)

EXERCISE 3

**With respect to the Testing for Covid-19,**

1. **Calculate P(T) when P(T|B) = 0.99 and P(T|B’) = 0.05**

**!Note we assume that P(B) = 0.1% = 0.001**

1. **Calculate P(B|T) and P(B|T’) if P(T|B) = 0.99 and P(T|B’) = 0.05**