STATISTICS APPLIED TO BUSINESS ADMINISTRATION. ACADEMIC YEAR 2013-2014 SEMINAR 1 (60 MINUTES)

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EXERCISE 1 (4 POINTS)

A given manufacturer sends batches, each containing 20 items of a specific product, to his/her clients. The probability that one specific item of a given batch is a defective one is equal to 0.05, and we assume independence between the different items in the batches.

1. **(1 point)** What is the expected number of defective items in a given batch?
2. **(1 point)** What is the probability that there are no defective items in a given batch?
3. **(1 point)** A client of this manufacturer receives 10 different batches of items such as the aforementioned ones. What is the expected number of batches having no defective items?
4. **(1 point)** What is the probability that, among the 10 different batches, there are no batches with defective items?

EXERCISE 2 (3 POINTS)

The probability that a managerial employee makes a mistake when typing a given page is equal to 0.01. We assume independence between the different typed pages.

1. **(1 point)** What is the probability that s/he makes one mistake when typing six pages?
2. **(1 point)** What is the approximate probability that in a specific document that includes 200 pages, s/he makes exactly four mistakes?
3. **(1 point)** If over the last month s/he has typed exactly 5000 pages, what is the approximate probability that s/he has made 53 mistakes?

EXERCISE 3 (3 POINTS)

Let X, Y, Z and V be four independent random variables distributed as $\gamma(\frac{1}{2}, \frac{5}{2})$, $\gamma(\frac{1}{2}, \frac{3}{2})$, $N(0, 1)$ and $N(-2, \sigma^2 = 9)$, respectively. You need to answer each of the questions listed below.

1. **(1 point)** Find the distribution of the random variable $T = X + Y + Z^2$, and compute the probability that T takes on values between 3.33 and 8.34.
2. **(1 point)** Find the distribution of the random variable $W = \frac{V+2}{\sqrt{T}}$, and compute the probability that W takes on values larger than 1.83.
3. **(0.5 points)** Compute the value of k such that $P(|W| > k) = 0.50$ holds.
4. **(0.5 points)** Compute the value of $P(W^2 < 5.12)$.

Remark: This piece of paper should be handed in together with your solutions to the aforementioned exercises. You should also write, both on this piece of paper and in the solutions you provide, the names of the students in your group that have actively participated in this seminar activity.