STATISTICS APPLIED TO BUSINESS ADMINISTRATION. ACADEMIC YEAR 2012-2013 SEMINAR 2 (35 minutes)

Date:	
Complete name:	ID number:

EXERCISE 1 (5 POINTS)

Let X, Y and Z be three independent r.v. such that their distributions are given by: $X \in N(-5, \sigma^2 = 9), Y \in \chi_9^2$ and $Z \in \chi_3^2$.

- 1. <u>(1 point)</u> Compute, providing all relevant details, the mean and the variance of the random variable $\left(\frac{X+5}{3}\right)^2$.
- 2. <u>(2 points)</u> Verify that the random variable $V = \frac{(X+5)}{\sqrt{Y}}$ follows a Student's distribution t with 9 degrees of freedom. In addition, compute $P(V^2 < 3.36)$.
- 3. <u>(2 points)</u> Verify that the random variable $W = \frac{Y}{3Z}$ follows a Snedecor's \mathcal{F} distribution with 9 and 3 degrees of freedom, $\mathcal{F}_{9,3}$. In addition, find the value for k such that P(W > k) = 0.9 holds.

EXERCISE 2 (3 POINTS)

Let X_1, \ldots, X_{10} be a set of 10 independent and identically distributed random variables that follow an exponential distribution with parameter $\frac{1}{2}$, $X_i \in \exp(\frac{1}{2}), \forall i = 1, \ldots, 10$. Let us consider the r.v. $Y = X_1 + X_2 + \ldots + X_{10}$.

- 1. (1.5 points) What are the mean and the variance of the r.v. Y?
- 2. (1.5 points) Compute $P(10.9 \le Y \le 23.8)$.

EXERCISE 3 (2 POINTS)

Let X be a r.v. that follows a Student's t distribution with 12 degrees of freedom.

- 1. (0.5 points) Compute P(X > 2.18).
- 2. (0.5 points) Compute $P(X \ge -1.78)$.
- 3. (0.5 points) Compute $P(X \in (0.539, 1.78))$.
- 4. (0.5 points) Find the value for k such that P(|X| < k) = 0.98 holds.

<u>Remark</u>: 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.