

**STATISTICS APPLIED TO BUSINESS  
ADMINISTRATION  
SEMINAR 3**

Date: \_\_\_\_\_

Complete name: \_\_\_\_\_ ID number: \_\_\_\_\_

Complete name: \_\_\_\_\_ ID number: \_\_\_\_\_

Complete name: \_\_\_\_\_ ID number: \_\_\_\_\_

Complete name: \_\_\_\_\_ ID number: \_\_\_\_\_

Complete name: \_\_\_\_\_ ID number: \_\_\_\_\_

**EXERCISE 1 (2.5 POINTS)**

Let  $X_1$ ,  $X_2$  and  $X_3$  be three independent r.v. such that:  $X_1 \in N(-2, \sigma^2 = 4)$ ,  $X_2 \in N(0, \sigma^2 = 9)$  and  $X_3 \in N(5, \sigma^2 = 1)$ .

1. **(1.25 points)** Let  $V = \frac{\sqrt{2}(X_3 - 5)}{\sqrt{\left(\frac{X_1+2}{2}\right)^2 + \left(\frac{X_2}{3}\right)^2}}$ . Compute  $P(V^2 \leq 8.53)$ .

2. **(1.25 points)** Let  $W = \frac{1}{4}(X_1 + 2)^2 + \frac{1}{9}X_2^2 + (X_3 - 5)^2$ . Compute  $P(W < 2.37)$ .

**EXERCISE 2 (2.5 POINTS)**

Let  $X$  be a r.v. with characteristic function given by  $\psi_x(u) = (1 - 10iu)^{-1}$

1. **(1.25 points)** Compute the mean and the variance of the r.v.  $X$ .

2. **(1.25 points)** What is the value of  $P(4 < X < 9)$ ?

### EXERCISE 3 (2.5 POINTS)

Let  $Y$  be a r.v. having an  $F_{2,3}$  distribution.

1. (1.25 points) Compute  $P(Y < 5.46)$ .
2. (1.25 puntos) Find the value of  $k$  such that  $P(Y > k) = 0.95$ .

### EXERCISE 4 (2.5 POINTS)

Let  $X$  be a r.v. so that it follows a Student's  $t$  distribution with 8 degrees of freedom. Compute the following probabilities.

1. (0.5 points)  $P(X > 2.90)$ .
2. (0.5 points)  $P(-0.706 < X < 0.706)$ .
3. (0.5 points) Find the value of  $k$  such that  $P(|X| < k) = 0.8$ .
4. (0.5 points)  $P(-0.706 < X < 1.40)$ .
5. (0.5 points) Find the value of  $k$  such that  $P(X < k) = 0.2$ .

**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 write, the names of the students in your group that have actively participated in this seminar activity.