

Statistics I, Group 04. Prof. M. Creel

Second Exam, Wed. 25 November, 2009

NAME:

DNI:

Signature:

Do not begin working on the exam until told to do so. Read the whole exam. There are **4 pages and 4 questions**. Brief clarifying questions are allowed before work begins. Once all questions have been answered, you may begin work. No further questions are allowed after this point. Do not attempt to copy the work of other students. If you are caught, you will lose the opportunity to take the short exams. Answer in the space provided, and please try to write clearly. You may answer in English, Catalan or Spanish. **All exams must be turned in by 13:05.**

1. Suppose that X is a random variable that follows the binomial distribution with $n = 3$ and $p = 1/3$.

Complete the following table, for all values of x such that $f_X(x) > 0$. Show how you make the calculations that allow you to fill in the numbers.

x	$f_X(x)$	$F_X(x)$

2. Consider the random experiment of tossing a normal die a single time. (A normal die is a cube with the numbers 1 to 6 on the faces, and it is equally likely to obtain any of these numbers on a given toss of the die.) Let s be an elementary outcome, which is the number showing on the die, after the toss. Define the random variable

$$X = s^2$$

- (a) list all elementary outcomes s and the associated values of the random variable X .

- (b) what is the density function of X ? Give a complete mathematical description.

- (c) what is the distribution function of X ? Give a complete mathematical description.

(d) what is the probability that $X = 4$?

(e) what is the probability that $8 < X < 20$?

(f) what is the probability that $X < 30$?

3. Consider the function

$$f_X(x) = a(x^2 + 1), -1 < x < 1$$

$$f_X(x) = 0, \text{ other values}$$

For what value of a is $f_X(x)$ a density function? Explain your answer.

4. Given a random variable X with the density function $f_X(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$, which is represented in the Figure:

(a) give the formula for the distribution function, $F_X(x)$

(b) what is the probability that $X < \frac{1}{2}$?