

Math 431 Second Evening Exam

6:15 - 7:15pm, April 13, 2004

Márton Balázs

NAME:

1. (35 points) A bakery puts chocolate chips in muffins. On average, how many chips should be put in one muffin if the baker wants to have at least one chip in a muffin with probability 90%?

2. (45 points) How many times should we flip a fair coin if we want at least 45%, at most 55% of the outcomes to be heads with probability 99%?

The standard normal distribution is to be found on the last page.

3. (35 points) Let X be a standard normal random variable. Compute the probability density function of $Y = X^3$.

4. We independently and randomly select two points on the same real interval $(0, 1)$. Let D denote the distance between them.

(a) (20 points) Find the probability distribution function of the random variable D .

(b) (10 points) Find the probability density function of the random variable D .

(c) (15 points) Find the expected value of D .

Bonus question: (5 points) Now find the expected value of D without the use of the distribution or density function, only by conditioning on the two points falling in the same half-interval, or one falling in $(0, \frac{1}{2})$ and the other in $(\frac{1}{2}, 1)$. In the first case, the expectation is simply divided by two (why?), while in the second case it's very easy to compute.