

## STATISTICS, Homework Exercises 2.

1. In a multiple choice exam with 5 possible answers for each of the 10 questions, what is the probability that a student would get 8 or more correct answers just by guessing?
2. In a book of 600 pages there are 1500 typographical errors (typos). Suppose that the number of typos on a page has Poisson distribution. Calculate the probability that opening the book at random, there are at least two typos on that page. Give the mode of the typos on a single page. Then calculate the probability that opening the book randomly and reading 3 consecutive pages, we find at most 5 typos.
3. Let  $X_1, X_2, X_3$  be i.i.d. sample from Poisson distribution with unknown parameter  $\lambda$ . Which of the following statistics is an unbiased estimator of  $\lambda$ ?
  - (a)  $\bar{X}$
  - (b)  $\frac{1}{2}X_1 + \frac{1}{3}X_2$
  - (c)  $\frac{1}{2}X_1 + \frac{1}{3}X_2 + \frac{1}{6}X_3$
  - (d)  $\sum_{i=1}^3 (X_i - \bar{X})^2$
  - (e)  $\frac{1}{2} \sum_{i=1}^3 (X_i - \bar{X})^2$
  - (f)  $\frac{1}{3} \sum_{i=1}^3 (X_i - \bar{X})^2$
4. Let  $x_1, \dots, x_{20}$  be the realization of an i.i.d. sample from Gaussian distribution with unknown expectation  $\mu$  and known standard deviation 0.05. Based on  $\bar{x} = 1.5$ , give the 98% confidence interval for  $\mu$ .
5. Let  $x_1, \dots, x_{20}$  be the realization of an i.i.d. sample from Gaussian distribution with unknown expectation  $\mu$  and unknown standard deviation. Based on  $\bar{x} = 1.5$  and  $s^* = 0.05$  give the 98% confidence interval for  $\mu$ .