

FALL/2018/MA526: REVIEW FOR MID-TERM 2

Instructor: Guangqu Zheng¹

Total points: 0.

The second mid-term will mainly cover materials from Chapter 5, 6, 8 including discrete, continuous distribution, basic sample statistics.

Q1 Write now the probability mass functions of the following discrete distributions.

- Binomial distribution with parameter (n, p) . Compute its mean and variance. Review its normal approximation.
- Negative binomial distribution with parameter (k, p) : roughly, the number of (independent) trials you need to get your k th success. p is the success probability.
- Geometric distribution with success probability p . This is a special case of the Negative binomial distribution.
- Poisson distribution with average λ . Compute the third moment of this distribution.

Q2 Review the probability density functions of the following continuous distributions.

- uniform distribution over $[1, 10]$. Find its mean and variance.
- normal distribution with mean 1 and standard deviation 2. Find its third moment. Get familiar with the use of normal table.
- Exponential distribution with expected value 4. Recall its memory-less property.
- Gamma distribution. Try to find the value $\Gamma(1/2)$, that is, to compute

$$\Gamma(1/2) = \int_0^{\infty} x^{1/2} e^{-x} dx = ?.$$

- $\chi_n^2 = X_1^2 + \dots + X_n^2$ with X_1, \dots, X_n iid standard normal.
- Beta distribution with parameter $(1/2, 1/2)$. Is uniform random variable over $[0, 1]$ a Beta random variable?

Q3 Review the following statistics:

- Sample average of a random sample of n i.i.d. random variables X_1, \dots, X_n . What do and law of large number and central limit theorem tell you?
- Sample variance. When the population is normal, after proper scale, we can get the chi-square distribution.

Please review the past homework problems and it will be helpful for you to do review exercises in the textbook.

¹gzheng90@ku.edu; Office hours: MWF 3:00-3:50; Office = 641 Snow Hall