Exercise 1

Probability Theory

Deadline: September 28, 2016.

Note:
For calculation problem, please give details of the derivation. Answers will receive only half of the points.

1. Reading.
   (a) Lecture notes 1.
   (b) Chapter 1 of the book "Statistical Inference".
2. Exercises of Charpter 1 of the book "Statistical Inference" :
   $1.2, 1.4, 1.11, 1.13, 1.21, 1.22, 1.29, 1.38, 1.41, 1.49, 1.50, 1.52$
3. A random variable X is said to have a Gamma distribution if its pdf is:

$$f(x|\alpha,\theta) = \frac{1}{\Gamma(\alpha)\theta^{\alpha}} x^{\alpha-1} e^{-x/\theta}, x \in [0,\infty), \alpha > 0, \theta > 0$$

   (a) Verify $f(x|\alpha,\theta)$ is a valid pdf.
   (b) Find **mean** and **variance** of X.
   (c) Let $Y = 1/X$. What is the pdf of Y?(Y is said to have an inverse gamma distribution)