Bios 660/Bios 672 (3 Credits)
Probability and Statistical Inference 1

Homework 1

Due: Tue. August 28, 2018 at the Beginning of Class

Special Note: when turning in homework, please **staple** the answers into **3 groups**: (a) Questions 1, 2, and 3; (b) Questions 4 and 5; (c) Questions 6 and 7.

1. Casella and Berger, Exercise 1.1.

2. A hospital administator codes incoming patients suffering gunshot wounds according to whether or not they have insurance (coding 1 if they do and 0 if they do not) and according to their condition, which is rated as good (g), fair (f), and serious (s). Consider an experiment that consists of the coding of such a patient.

   (a) Give the sample space of this experiment.

   (b) Let A be the event that the patient is in serious condition. Specify the outcomes in A.

   (c) Let B be the event that the patient is uninsured. Specify the outcomes in B.

   (d) Give all outcomes in the event $B^c \cup A$.

3. Find A^c with respect to Ω for:

   (a) $\Omega = \{x : 0 < x < 1\}$, and $A = \{x : 0.5 < x < 1\}$;

   (b) $\Omega = \{(x, y) : |x| + |y| \leq 2\}$, and $A = \{(x, y) : x^2 + y^2 < 2\}$;

   (c) $\Omega = \mathbb{R}^1$, $A = \bigcap_{n=1}^{\infty} B_n$, where $B_n = \{x :\in (0, 1/n)\}$.

4. For any three sets, A, B, and C, show that $A \,\Delta\, B = C$ if and only if $A = B \,\Delta\, C$.

5. Casella and Berger, 1.9.

6. Show $(\limsup_n A_n) \cap (\limsup_n B_n) \supset \limsup_n (A_n \cap B_n)$ and $(\limsup_n A_n) \cup (\limsup_n B_n) = \limsup_n (A_n \cup B_n)$.

7. Show that $\liminf_n A_n \subset \limsup_n A_n$.