Stat 351 Fall 2015
Assignment #5

Solutions should be completed, but not submitted, by Wednesday, November 4, 2015.

1. Chapter 4 Problem #1, page 113. Since the random vector $(X,Y,Z)'$ is continuous and the density $f(x,y,z)$ is symmetric in x, y, and z, we can immediately conclude that $P(X<Y<Z) = 1/6$. (Compare this to Problem 6 on Assignment #1.) However, I would like to you write down an iterated integral to represent

$$P(X<Y<Z) = \iiint_{\{x<y<z\}} f(x,y,z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z.$$

(There are $3! = 6$ different integrals that you can choose depending on your order of $\mathrm{d}x$, $\mathrm{d}y$, and $\mathrm{d}z$.) Then compute this integral and verify that you do, in fact, get $1/6$.

2. Chapter 4 Problem, pages 113–114, #6 through #11. Problems involving order statistics of uniform random variables are suitable for exams!

3. Chapter 4 Problems, pages 113–116, #3, #5, #15, #16, #17, #19, #20, #21, #22, #24, #27

4. Chapter 4 Problem #27, page 116. The distribution of $V = \max\{X_1,\ldots,X_N\}$ is interpreted to be a conditional distribution in the following sense. Suppose that $N=n$ is fixed. Determine the distribution of $\max\{X_1,\ldots,X_n\}$ which is really the conditional distribution $V|N=n$. You can now find the distribution of V using the law of total probability. (Don't forget to handle the case $N=0$ separately.) Also, you will find it easier to calculate $E(V)$ by first calculating $E(V|N=n)$.