BUEC 333: Some Study Questions for the Midterm

1. All questions in Studenmund Ch1,2,3,17.

2. Would sampling only the right-hand side of the classroom be a *biased* sample?

3. Construct the pdf and cdf for the sum of 3 dice. Using the cdf, show the probability of getting a sum in the range of [6,8].

4. Consider a sample of 100 observations of the values of the sum of 3 dice. Consider a statistic equal to the average value of these 100 observations. Why is the sampling variance of that statistic so much smaller than the sample variance of the sum of 3 dice?

5. Construct the pdf and cdf for the sum of 4 coin flips (0,1). Using the cdf, show the probability of getting at least 3 heads.

6. Consider a discrete random variable *Y* whose pdf is given by the table:

range:	-2	-1	0	1	2
probability:	0.067	0.242	0.382	0.242	0.067

This discrete random variable was created by discretizing the standard normal into ranges (less than -1.5), (-1.5 to -0.5), (-0.5 to 0.5), (0.5 to 1.5) and (1.5 and up), and assigning values -2,-1,0,1 and 2. What is the pdf and cdf for the $W=2Y+3$? What is $E[W]$ and $Var[W]$? What is the pdf and cdf for $V=Y*Y$? What is $E[V]$ and $Var[V]$?

7. Consider 2 independent random variables, each of which follows the Standard Uniform distribution U(0,1). What is the joint distribution of these 2 variables? Show the pdf for a random variable equal to the sum of these.

8. Consider this cross-tab from the first lecture. It gives the numbers of respondents in categories of earnings from wages and salaries and immigrant status. Assume that all workers in the range 1-$20k earned $10,000, that all workers in the range $20k-$50k earned $35,000 and that all workers in the range $50k+ earned $80,000. What is the mean of earnings from wages and salaries in this sample? What is the conditional mean of earnings, given that immigrant status is equal to "Temporary Resident"? What is the conditional mean of earnings, given that immigrant status is equal to "Canadian-born"; What is the conditional mean of earnings, given that immigrant status is equal to "Foreign-born Permanent Resident"? (You have just made a table of means.)   Now, drop the Temporary residents from the analysis, and create a new variable called IMMIG with the value 0 for Canadian born people, and 1 for Foreign born permanent residents. What is the covariance of IMMIG and earnings from wages and salaries in this sample? Are IMMIG and earnings from wage and salaries independent?

Immigrant status	Zero	groupWAGES 1-$20k	$20K-$50k	$50k+	Total
Temporary Residents	274	162	103	69	608
Canadian-born	3,962	3,125	5,823	4,820	17,730
Foreign-born Perm Res	5,206	3,608	4,573	2,304	15,691
Total	9,442	6,895	10,499	7,193	34,029

9.

10. Consider a 100 observations of a random variable distributed N(4,1600). What is the distribution of the average of those 100 observations? (That is, what is the sampling distribution of a statistic equal to the sample mean?) Consider 100 observations of a random variable with an unknown distribution, whose sample mean and sample variance are 4 and 1600, respectively. Invoking a central limit theorem, what is the distribution of the average of those 100 observations? What is the probability that the true value of the population mean is 0, but we just happened to draw a sample whose average is 4 or more? Do we reject the hypothesis that the population mean is 0? What is the 80% confidence interval for the true mean of the variable in the population?

11. What is linear in a linear regression? In the case when there are many variables, how are regressions different from a table of means? Are regression coefficients weighted sums of the dependent variable? If so, what are the weights?