Mathematics for Liberal Arts (Math 102) Exam 3

Date: May 15, 2007 Professor Ilya Kofman

NAME: _____

You must **show your work** to get full credit!

Problem 1. *Suppose CSI will gather student opinion in three surveys to decide whether to build a new parking lot. For each survey, identify the bias and explain.*

(a) *Survey 1 is a website that all students can access to express their opinion.*

(b) *Survey 2 asks randomly selected students who enter the bookstore.*

(c) *Survey 3 asks randomly selected students whether a large grove of trees should be cut down for the new parking lot.*

Problem 2. *Using the following list of random numbers, choose a simple random sample of five students from a class of* 20 *students. If you label all students* 01 *to* 20*, which five will be chosen? (Do not reuse digits.)*

36071087272972407656531260204178127245863609931694376

Problem 3. *A random sample of* 3000 *students who took the SAT found that* 750 *paid for SAT-prep courses, and* 2250 *had not.*

(a) *What is $\hat{p}$ (as a percent) for this sample?*

(b) *What is the standard deviation σ (as a percent) for this sample?*

(c) *Give a* 95% *confidence interval for the percent of students who pay for SAT-prep.*

(d) *What is the margin of error (as a percent) for this survey?*

(e) *Suppose you want a margin of error half as large as in this survey. How many students must you interview?*

(f) *If you require* 99.7% *confidence, what is the margin of error?*

Problem 4. *Two spinners each have three equal regions. Spinner* 1 *is marked* $\{1, 3, 5\}$. *Spinner* 2 *is marked* $\{2, 4, 6\}$. *The game is to spin each spinner once, and add up the scores.*

(a) *What is the sample space of total scores?*

(b) *Write down the probability model as a chart of probabilities.*

(c) *What is the probability that your total is even?*

(d) *What is the probability that your total is* <u>not</u> 9*?*

(e) *What is the mean of this probability model?*

(f) *What is the standard deviation of this probability model?*

Problem 5.

(a) *How many* 4*-digit numbers are there?*

(b) *What is the probability that a randomly selected* 4*-digit number is a multiple of* 5*?*

(c) *A deck of* 52 *cards has* 4 *aces. What is the probability you will draw two aces?*

Problem 6. *The scores of high-school seniors on the NAEP test had a distribution that was approximately normal, with mean* $\mu = 300$ *and standard deviation* $\sigma = 36$.

(a) *What is the probability that a random senior's score is higher than* 300*?*

(b) *What is the probability that a random senior's score is lower than* 336*?*