Review of Introduction to Probability and Statistics

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Practice Final Exam

This exam is closed books and notes. You can use the equation summary sheet (3 pages) and probability distribution tables found on the webpage. Calculators allowed (and encouraged).

1. Please calculate summary statistics for an oil well's daily production, in barrels.

   214, 203, 226, 198, 243, 225, 207, 203, 208

   a. Mean
   b. Median
   c. Standard Deviation
   d. 90% confidence interval around the mean

2. Please calculate least-squares linear regression statistics (slope, intercept, goodness of fit) for the pressure (x) vs. flow rate (y) data below. Summary statistics have been precalculated for your convenience.

Pressure	5	6	7	8	9	10
Flow	14	25	70	85	49	105

$\bar{x} = 7.5, \quad s_x = 1.871, \quad \bar{y} = 58, \quad s_x = 35.18, \quad cov(x, y) = 54.2$

3. For the least-squares best fit line of problem 2, the standard deviation of the residuals was found to be 22.31. Use this and other information from problem 2 to calculate the 95% confidence intervals for your estimates of the slope and intercept.

4. For the least-squares best fit line of problems 2 and 3, calculate the predicted value for x = 8. Show the 95% confidence interval for this prediction.

5. A bowl contains 10 marbles, four of which are blue. What is the probability that two marbles chosen at random will both be blue?

6. Consider a family photo where the grandmother is to be in the center of a line of people. Given 7 family members in the photo (including grandmother), how many different ways are there to line up the people?

7. I have 20 students in my class, and I randomly assign two of them to clean my erasers after class. How many different pairs of eraser cleaners are there?

8. The number of bad checks that a bank receives each day can be modelled as a Poisson distribution with λ = average number of bad checks received per day. If $\lambda = 6$, what is the probability that 4 bad check will be received on any given day?

9. The humidity in a controlled environment is modeled as a normal random variable with mean and standard deviation equal to 40% and 2.2%, respectively. What is the probability that the humidity will exceed 45%?

10. Two neighborhoods disagree about whether people in the first neighborhood are more energy conscious than the second. Below are the statistics for last June's electricity usage (in kW-h) at the houses of these two neighborhoods. Perform an hypothesis test to help settle this dispute.

	Mean	Std. Dev.	Number of houses
Neighborhood 1	1216	188	55
Neighborhood 2	1307	170	42