Stat 20: some review for midterm 2

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The exam covers Chapters 12 through 20 of the text. Here I'll ask a few questions from each chapter that you should be able to answer.

Chapter 12: The regression line

- how do you find the equation of a regression line?
- what is the meaning of the slope and intercept of this line?
- what is the relationship (if any) between the regression line predicting y from x and that predicting x from y?

You should understand that the regression line minimizes the RMS error ("least-squares") But you don't need to know how to use this to derive an equation for the regression line.

Chapter 13: What are the chances?

- what is conditional probability?
- when can we multiply probabilities?
- what is the difference between sampling with and without replacement?
- what is independence?

Chapter 14: More about chance

- how can we compute probabilities by counting?
- when are events mutually exclusive?

Chapter 15: The binomial formula

- how do we compute binomial coefficients?
- how do we compute the chance that an event will occur exactly k times out of n?

At this point I proved a recursive formula for the binomial coefficients $\binom{n}{k} = \binom{n-1}{k} + \binom{n-1}{k-1}$ and showed that $\binom{n}{k}p^k(1-p)^{n-k}$ is largest as a function of k when $k \approx np$. I also used Stirling's formula, $n! \approx \sqrt{2\pi n}(n/e)^n$ These are nice things to know, but are not on the exam.

Chapter 16: The law of averages

- what does the law of averages say about the *number* of heads in coin-flipping? the percentage?
- what is the sum of draws process?
- what is a box model? how do we set it up?

Chapter 17: The expected value and standard error

- how do we compute the expected value and standard error of a box?
- how do we compute the EV and SE of a sum of draws?
- how do we use the normal curve to find the probability that a sum of draws is between specified numbers?
- how can we use boxes full of 0s and 1s in order to use the answers to the previous questions in counting?

Chapter 18: The normal approximation for probability histograms

- what is a probability histogram?
- which probability histograms approach the normal curve?

Chapter 19: Sample surveys

- words to know: population, sample, parameter, statistic, simple random sampling, quota sampling, stratified random sampling, non-response bias, chance error

You don't need to know the details of specific surveys the text talks about.

Chapter 20: Chance errors in sampling

- how do we compute the chance error in a sample from some population?
- why is the chance error important?
- what is the relationship between sample size, population size, and accuracy of a sample?
- how do we use the normal curve?