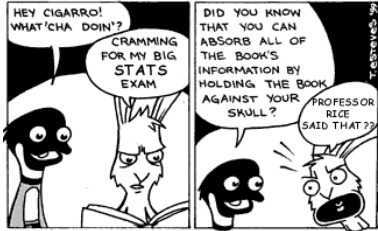


# Review for 2nd Midterm



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## Topics

- Probability
  - Multiplication rule and conditional prob
  - Independence
  - Complete lists
  - Addition rule
  - Binomial coeff
  - Binomial prob formula
- Chance variability
  - Box models
  - Sums of draws
  - Chance error
  - Law of averages
  - Expected value and se for sums
  - Probability histograms and normal approx to binomial and more general sums
- Sampling
  - methods, bias, prob samples
  - EV and SE for percentages and averages
  - Bootstrap estimate of SE
  - Confidence intervals

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A bag contains 3 red apples and 2 green apples. You take out one apple and then another (without replacement).

(a) The chance that you get two red apples equals \_\_\_\_\_.

(b) The chance you get one red apple and one green apple equals \_\_\_\_\_.

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A circuit in a complex electronic device fails with probability .1, in which case an identical and independent back-up unit is used. The entire device fails if both circuits fail.

- (a) The chance the device works equals \_\_\_\_\_.
- (b) The chance the device fails at least once on 100 independent trials is \_\_\_\_\_.

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One box contains tickets with the numbers 1, 2, and 3 and another box contains tickets with the numbers 3, 4, and 5. One ticket is drawn from each box.

- (a) The chance that they are both even equals \_\_\_\_\_.
- (b) The chance at least one number is even equals \_\_\_\_\_.

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A store serves 12 different flavors of ice cream. If you order a bowl with 3 scoops, each of a different flavor, how many choices (possible bowls) do you have to choose from?

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A family has five children. Suppose that the genders of the children are independent and that each has probability  $\frac{1}{2}$ .

- (a) The chance that there are exactly three boys equals \_\_\_\_\_.
- (b) The chance that there is at least one boy equals \_\_\_\_\_.

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A bag contains three red apples and two green apples. If you reach in and pull out a green apple you win \$2 and if you choose a red apple you lose \$1. You play this game 100 times (drawing apples with replacement).

- (a) By how much do you expect to be behind or ahead after playing 100 times?
- (b) The chance that you come out ahead is approximately \_\_\_\_\_.

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A box contains 100 tickets with various numbers whose average equals 0. You can choose to play one of two games: (i) you draw 100 times from the box and win \$1 if the sum is between  $-10$  and  $10$ , or (ii) you draw 400 times and win \$1 if the sum is between  $-40$  and  $40$ . Choose one option and circle it. Explain your answer.

- (a) You would be better off to play game (i).
- (b) You would be better off to play game (ii).
- (c) The games are equivalent.

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A school lunch program prepares food for 400 students and they wonder how many apples to stock on a given day. Suppose that each student independently chooses to take an apple with probability  $1/5$  or not take an apple with probability  $4/5$ . A worker claims that there is little chance that they will run out if they stock 100 apples. Do you agree or disagree and why?

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A survey was done of 50,000 households from which a simple random sample of 400 was taken. Of those 400 households, 398 had at least one TV set. If possible, find an approximate 95% confidence interval for the percentage of households in the population having at least one TV.

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A simple random sample of 400 households was taken from a population of 50,000 households. All the adults over 21 were asked if they were employed and of 916, 715 were employed. If possible, give a 95% confidence interval for the percentage of adults in the population who were employed. If not possible, state why not.

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