Classroom Voting Questions: Statistics

Sampling Distributions for Counts and Proportions

1. Consider the following experiment. On a Friday night, a highway patrol officer sets up a roadblock and stops 100 drivers. A given driver is considered a success if he or she is wearing a seat belt; the driver is considered a failure otherwise. Can we consider this experiment a binomial experiment?

   (a) Yes

   (b) No

2. Consider the following experiment. A particular car club has 100 members, 70 of which regularly wear their seat belts and 30 of which do not. Ten of these members are selected at random without replacement as they leave a car show. A given driver is considered a success if he or she is wearing a seat belt. The driver is considered a failure otherwise. Can we consider this experiment a binomial experiment?

   (a) Yes

   (b) No

3. In 1938, Duke University researchers Pratt and Woodruff conducted an experiment looking for evidence of ESP (extrasensory perception). In the experiment, students were presented with five standard ESP symbols (square, wavy lines, circle, star, cross). The experimenter shuffled a desk of ESP cards, each of which had one of the five symbols on it. The experimenter drew a card from this deck, looked at it, and concentrated on the symbol on the card. The student would then guess the symbol, perhaps by reading the experimenter's mind. This experiment was repeated with 32 students for a total of 60,000 trials. The students were correct 12,489 times.

   If the students were selecting one of the five symbols as random, the probability of success would be $p = 0.2$ and we would expect the students to be correct 12,000 times out of 60,000. Should we write off the observed excess of 489 as nothing more than random variation?

   (a) Yes

   (b) No

4. For which of the following probabilities would the binomial distribution be appropriate?

(a) The probability of a randomly selected professional basketball player making half of his free throws throughout a regular 82-game NBA season.

(b) The probability that a randomly selected student from a randomly selected high-school within the greater New York City metropolitan area will be accepted to an elite University.

(c) The probability that a randomly selected engineering student from a specific University will take at least 3 attempts to pass the licensure exam.

(d) Two of the above are appropriate for the binomial distribution.

(e) All of the above are appropriate for the binomial distribution.

(f) None of the above is appropriate for the binomial distribution.

5. Suppose a family is randomly selected from among all families with 3 children. What is the probability that the family has exactly one boy? You may assume that Pr(boy) = Pr(girl) for each birth.

(a) 1/8

(b) 1/6

(c) 1/3

(d) 3/8

(e) 1/2

(f) 5/6

(g) 7/8

6. Suppose a family is randomly selected from among all families with 4 children. What is the probability that the family has exactly two boys? You may assume that Pr(boy) = Pr(girl) for each birth.

(a) 1/24

(b) 1/16

(c) 1/6

(d) 3/8

(e) 1/2

7. To measure the success of the latest treatment for iPod-related deafness among young adults, researchers measured the sound sensitivity of 100 young adults by having them stand 20 feet away from a speaker playing "Slim Whitman Favorite Hits." It was found that 35% of the sample could not repeat any song lyrics from the CD. What is the mean of this distribution?

(a) (20)(.35)

(b) (20)(.65)

(c) (20)(.35)(.65)

(d) (.35)(.65)

(e) (100)(.35)

(f) (100)(.65)

(g) (100)(.35)(.65)

(h) insufficient information

8. To measure the success of the latest treatment for iPod-related deafness among young adults, researchers measured the sound sensitivity of 100 young adults by having them stand 20 feet away from a speaker playing "Slim Whitman Favorite Hits." It was found that 35% of the sample could not repeat any song lyrics from the CD. What is the variance of this distribution?

(a) (20)(.35)

(b) (20)(.65)

(c) (20)(.35)(.65)

(d) (.35)(.65)

(e) (100)(.35)

(f) (100)(.65)

(g) (100)(.35)(.65)

(h) insufficient information