

AP Statistics - Unit 5 (Chapters 17-18) Extra Practice: Part 1

1. An airplane has a front and a rear door that are both opened to allow passengers to exit when the plane lands. The plane has 100 passengers seated. The number of passengers exiting through the front door should have
 - A) a binomial distribution with mean 50
 - B) a binomial distribution with 100 trials but success probability not equal to 0.5
 - C) a normal distribution with a standard deviation of 5
 - D) none of the above

2. A small class has 10 students. Five of the students are male and five are female. I write the name of each student on a 3-by-5 card. The cards are shuffled thoroughly and I choose one at random, observe the name of the student, and replace it in the set. The cards are thoroughly reshuffled and I again choose a card at random, observe the name, and replace it in the set. This is done a total of four times. Let X be the number of cards observed in these four trials with a name corresponding to a male student. The random variable X has which of the following probability distributions?
 - A) the normal distribution with mean 2 and variance 1
 - B) the binomial distribution with parameters $n = 4$ and $p = 0.5$
 - C) the uniform distribution on 0, 1, 2, 3, 4
 - D) none of the above

5. A set of 10 cards consists of five red cards and five black cards. The cards are shuffled thoroughly and I choose six of these at random. Let X be the number of red cards observed in the six chosen. The random variable X has which of the following probability distributions?
 - A) the normal distribution with mean 3 and variance 1.22
 - B) the binomial distribution with parameters $n = 6$ and $p = 0.5$
 - C) the uniform distribution of 0, 1, 2, 3, 4, 5, 6
 - D) none of the above

9. In a certain game of chance, your chances of winning are 0.2. If you play the game five times and outcomes are independent, the probability that you win all five times is
 - A) 0.6723
 - B) 0.3277
 - C) 0.04
 - D) 0.00032

10. In a certain game of chance, your chances of winning are 0.2. You play the game five times and outcomes are independent. Suppose it costs \$1 to play the game. If you win, you receive \$4 (for a net gain of \$3). If you lose, you receive nothing (for a net loss of \$1). Your expected winnings are
 - A) \$3
 - B) \$0
 - C) -\$1
 - D) -\$2

14. A fair coin (one for which both the probability of heads and the probability of tails are 0.5) is tossed six times. The probability that less than 1/3 of the tosses are heads is
 - A) 0.33
 - B) 0.109
 - C) 0.09
 - D) 0.0043

15. A fair coin (one for which both the probability of heads and the probability of tails are 0.5) is tossed 60 times. The probability that less than 1/3 of the tosses are heads is
 - A) 0.33
 - B) 0.109
 - C) 0.09
 - D) 0.005

19. Suppose X is a random variable with the $B(n = 9, p = 1/3)$ distribution. The probability X is either a 0 or a 1 is
 - A) 0.6667
 - B) 0.3333
 - C) 0.1431
 - D) 0.1111

20. Suppose X is a random variable with the $B(n = 6, p = 2/3)$ distribution. The probability X is at least 5 is
 - A) 0.6667
 - B) 0.4444
 - C) 0.3512
 - D) 0.0878

There are 20 multiple-choice questions on an exam, each having responses a, b, c, or d. Suppose a student *guesses* the answer to each question, and the guesses from question to question are independent. Let X be the number of questions for which the student has the same answer as the person sitting next to him on his right.

21. The distribution of X is
 - A) $B(20, .2)$
 - B) $B(20, .25)$
 - C) $B(4, .25)$
 - D) impossible to determine unless the student sitting next to him is also guessing.

22. The probability that X is zero is closest to
 A) 0.0032 B) 0.0243 C) 0.2373 D) 0.3277
23. A college basketball player makes 80% of his free throws. At the end of a game, his team is losing by two points. He is fouled attempting a three-point shot and is awarded three free throws. Assuming each free throw is independent, what is the probability that he makes at least two of the free throws?
 A) 0.896 B) 0.80 C) 0.64 D) 0.384
26. A fair die is rolled 12 times. The number of times an even number occurs on the 12 rolls has
 A) a binomial distribution with a mean of 2
 B) a binomial distribution with a standard deviation of 3
 C) a binomial distribution with a mean of 0.5
 D) none of the above
28. A college basketball player makes 80% of his free throws. Over the course of the season he will attempt 100 free throws. Assuming free throw attempts are independent, what is the probability that he makes at least 90 of these attempts?
 A) 0.90 B) 0.72 C) 0.2643 D) 0.0062

AP Statistics – Unit 5 (Chapters 17-18) Extra Practice: Part 2

1. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Donald Trump. The number 73% is a
 A) statistic B) sample C) parameter D) population
2. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Donald Trump. The unknown true percentage of American citizens that like Donald Trump is a
 A) statistic B) sample C) parameter D) population
5. The sampling distribution of a statistic is
 A) the probability that we obtain the statistic in repeated random samples
 B) the mechanism that determines whether randomization was effective
 C) the distribution of values taken by a statistic in all possible samples of the same size from the same population
 D) the extent to which the sample results differ systematically from the truth
6. The distribution of the values taken on by a statistic in all possible samples from the same population is called
 A) the parameter B) bias C) the sampling distribution D) a table of random digits
9. A statistic is said to be unbiased if
 A) the survey used to obtain the statistic was designed so as to avoid even the hint of racial or sexual prejudice
 B) the mean of its sampling distribution is equal to the true value of the parameter being estimated
 C) both the person who calculated the statistic and the subjects whose responses make up the statistic were truthful
 D) it is used for only honest purposes
12. The number of undergraduates at Johns Hopkins University is approximately 2000, while the number at Ohio State University is approximately 40,000. At both schools a simple random sample of about 3% of the undergraduates is taken. We conclude that
 A) the sample from Johns Hopkins has less variability than that from Ohio State
 B) the sample from Johns Hopkins has more variability than that from Ohio State
 C) the sample from Johns Hopkins has almost the same variability as that from Ohio State
 D) it is impossible to make any statements about the variability of the two samples since the students surveyed were different
13. Suppose you are going to roll a die 60 times and record p , the proportion of times that an even number (2, 4, or 6) is showing. The sampling distribution of p should be centered about
 A) $1/6$ B) $1/3$ C) $1/2$ D) 30

A survey asks a random sample of 1500 adults in Ohio if they support an increase in the state sales tax from 5% to 6%, with the additional revenue going to education. Let p denote the proportion in the sample that say they support the increase. Suppose that 40% of *all* adults in Ohio support the increase.

14. The mean μ_p of p is
 A) 5% B) $40\% \pm 5\%$ C) 0.40 D) 600
15. The standard deviation σ_p of p is
 A) 0.40 B) 0.24 C) 0.0126 D) 0.00016
16. The probability that p is more than 0.50 is
 A) less than 0.0001 B) about 0.1 C) 0.4602 D) 0.50
17. A fair coin (one for which both the probability of heads and the probability of tails are 0.5) is tossed 60 times. The probability that less than $1/3$ of the tosses are heads is
 A) 0.33 B) 0.109 C) 0.09 D) 0.0043
18. Suppose we select an SRS of size $n = 100$ from a large population having proportion p of successes. Let X be the number of successes in the sample. For which value of p would it be safe to assume the sampling distribution of X is approximately normal?
 A) 0.01 B) $1/9$ C) 0.975 D) 0.9999
22. A college basketball player makes 80% of his free throws. Over the course of the season he will attempt 100 free throws. Assuming free throw attempts are independent, what is the probability that he makes at least 90 of these attempts?
 A) 0.90 B) 0.72 C) 0.2643 D) 0.0062
24. A random sample of size 25 is to be taken from a population that is normally distributed with mean 60 and standard deviation 10. The number X of the observations in our sample that are larger than 60 is to be computed. The sampling distribution of X is
 A) normal with mean 60 and standard deviation 10 B) normal with mean 60 and standard deviation 2
 C) uniform D) none of the above
26. In a large population of adults, the mean IQ is 112 with a standard deviation of 20. Suppose 200 adults are randomly selected for a market research campaign. The distribution of the sample mean IQ is
 A) exactly normal, mean 112, standard deviation 20 B) approximately normal, mean 112, standard deviation 0.1
 C) approximately normal, mean 112, standard deviation 1.414
 D) approximately normal, mean 112, standard deviation 20

The scores of individual students on the American College Testing (ACT) Program composite college entrance examination have a normal distribution with mean 18.6 and standard deviation 6.0. At Northside High, 36 seniors take the test.

28. If the scores at this school have the same distribution as national scores, what is the mean of the sampling distribution of the average (sample mean) score for the 36 students?
 A) 1.0 B) 3.1 C) 6.0 D) 18.6
29. If the scores at this school have the same distribution as national scores, what is the standard deviation of the sampling distribution of the average (sample mean) score for the 36 students?
 A) 1.0 B) 3.1 C) 6.0 D) 18.6
30. If the scores at this school have the same distribution as national scores, the sampling distribution of the average (sample mean) score for the 36 students is
 A) approximately normal, but the approximation is poor B) approximately normal, and the approximation is good
 C) exactly normal D) neither normal nor nonnormal. It depends on the particular 36 students selected
31. I select a simple random sample of 4000 batteries produced in a manufacturing plant. I test each and record how long it takes for each battery to fail. I then compute the average J of all the failure times. The sampling distribution of J might be modeled as having approximately a
 A) binomial distribution B) uniform distribution C) normal distribution D) none of the above

35. The incomes in a certain large population of college teachers have a normal distribution with mean \$35,000 and standard deviation \$5000. Four teachers are selected at random from this population to serve on a salary review committee. What is the probability that their average salary exceeds \$40,000?
 A) .0228 B) .1587 C) .9772 D) essentially 0

The distribution of actual weights of 8-ounce chocolate bars produced by a certain machine is normal with mean 8.1 ounces and standard deviation 0.1 ounces.

36. If a sample of 5 of these chocolate bars is selected, the probability that their average weight is less than 8 ounces is
 A) 0.0125 B) 0.1853 C) 0.4871 D) 0.9873
37. If a sample of five of these chocolate bars is selected, there is only a 5% chance that the average weight of the sample of five of the chocolate bars will be below
 A) 7.94 ounces B) 8.03 ounces C) 8.08 ounces D) 8.20 ounces

A factory produces plate glass with a mean thickness of 4 millimeters and a standard deviation of 1.1 millimeters. A simple random sample of 100 sheets of glass is to be measured, and the sample mean thickness of the 100 sheets J is to be computed.

40. We know the random variable J has approximately a normal distribution because of
 A) the law of large numbers B) the central limit theorem
 C) the law of proportion D) the fact that probability is the long run proportion of times an event occurs
41. The probability that the average thickness J of the 100 sheets of glass is less than 4.1 millimeters is approximately
 A) 0.8186 B) 0.3183 C) 0.1814 D) 0.6817
42. In a large population of adults, the mean IQ is 112 with a standard deviation of 20. Suppose 200 adults are randomly selected for a market research campaign. The probability that the sample mean IQ is greater than 110 is approximately
 A) 0.079 B) 0.421 C) 0.921 D) 0.579
43. An automobile insurer has found that repair claims have a mean of \$920 and a standard deviation of \$870. Suppose that the next 100 claims can be regarded as a random sample from the long-run claims process. The probability that the average J of the 100 claims is larger than \$1000 is approximately
 A) 0.9200 B) 0.8212 C) 0.0800 D) 0.1788

Answer Key (part 1)

1.D 2.B 5.D 9.D 10.C 14.B 15.D 19.C 20.C 21.B 22.A 23.A 26.D 28.D

Answer Key (part 2)

1.A 2.C 5.C 6.C 9.B 12.B 13.C 14.C 15.C 16.A 17.D 18.B
 22.D 24.D 26.C 28.D 29.A 30.C 31.C 35.A 36.A 37.B 40.B 41.A 42.C 43.D