6.5 Section Exercises

Continuity Correction

Describe the area under the normal curve that would be used to approximate the binomial probability.

1. Consider the probability that at least 40 out of 232 planes will malfunction on the runway.
2. Consider the probability that at least 100 out of 250 new mothers received prenatal care.
3. Consider the probability that more than 500 out of 12,000 tax returns were filed incorrectly.
4. Consider the probability that more than 180 out of a sample of 1200 elderly people in the United States will have the flu this winter.
5. Consider the probability that at most 30 out of 534 smartphones on the assembly line are defective.
6. Consider the probability that at most 15 out of 400 high school seniors will not graduate on time.
7. Consider the probability that fewer than 12 out of 367 fourth graders will not pass the state placement test.
8. Consider the probability that 70 out of 100 trees planted in an orchard will live to maturity.
9. Consider the probability that 35 out of 200 registered voters will not vote in the election.
10. Consider the probability that at least 225 out of a sample of 1200 people will use the emergency room at the hospital this year.

Conditions for Using the Normal Distribution Approximation

Verify that a normal distribution can be used to approximate the binomial probability, or show how the conditions have not been met.

11. Consider the probability that fewer than 15 out of the 123 people watching a movie have already read the book. Assume that the probability of a given person having read the book is 40%.
12. Consider the probability that more than 100 out of 238 fifth graders have seen all of the Marvel movies. Assume that the probability of a given fifth grader having seen all of the Marvel movies is 54%.
13. Consider the probability that at most 2 out of 30 television sets on an assembly line are defective. Assume that the probability of a given television set being defective is 5%.
14. Consider the probability that no more than 5 out of 120 teenage girls become pregnant before finishing high school. Assume that the teen pregnancy rate is 4%.

Normal Distribution Approximation of Binomial Probability

Approximate the binomial probability using the normal distribution. You may safely assume that the conditions for using the normal distribution approximation have been met for each scenario.

15. What is the probability that more than 150 out of 230 eighth-graders at a local middle school have been exposed to drugs? Assume that a previous study at this school reported that the probability of an individual eighth-grade student having been exposed to drugs is 63%.
16. What is the probability that more than 100 out of 300 elections end in a runoff situation? One report suggests that there is a 32% chance of an individual election ending in a runoff situation.
17. What is the probability that more than 20 out of a class of 347 high school seniors will drive under the influence of alcohol on prom night? The local chapter of MADD fears that the probability of a high school senior drinking and driving on prom night is 38%.
18. What is the probability that more than 200 out of the 248 hunters staying at a hunting club this season will obtain their game of choice? Club records indicate that hunters have an 83% chance of obtaining their desired game animal.

19. What is the probability that at least 67 out of 100 cars stopped at a roadblock will not be given a ticket? Local authorities report that tickets usually are given to 23% of cars stopped.

20. What is the probability that at least 25 out of a survey of 200 Cajuns do not actually like Cajun food? A regional food critic believes that the probability of a Cajun not liking Cajun food is 14%.

21. What is the probability that at least 140 out of 200 drivers surveyed speed on a regular basis? The state's highway patrol estimates that 78% of drivers typically exceed the speed limit.

22. What is the probability that at least 130 out of 145 preschoolers watch more than four hours of television per night? One previous study indicates that the probability that a preschooler watches more than four hours of television per night is 84%.

23. What is the probability that no more than 32 out of 150 vehicles inspected at a service station will fail their yearly inspection and not receive an inspection sticker? One service station's records indicate that the probability of a car failing its inspection is 18%.

24. What is the probability that no more than 130 out of the 2300 tax returns filed at a local CPA's office will be inaccurate? Previous records indicate only a 7% probability that a given tax return from this office is incorrect.

25. What is the probability that no more than 5 out of 250 puppies born to a well-respected dog breeder will have birth defects? This dog breeder usually averages only 2 birth defects in 50 births.

26. What is the probability that no more than 50 out of 150 former smokers will resume smoking within six months of quitting? Assume that the probability of a former smoker resuming smoking is 35%.

27. What is the probability that fewer than 100 homes out of a sample of 1200 homes will not have a TV? A study indicates that 9 out of 10 homes have televisions.

28. What is the probability that fewer than 100 out of 320 high school graduates will not attend college? The registrar's office at a local college estimates that the probability of a high school graduate going on to college is 68.1%.

29. What is the probability that 125 out of 200 people are overweight? Estimates show that the probability of someone being overweight is 65%.

30. What is the probability that out of 350 entering college freshmen, 100 will need to take a co-requisite mathematics class? Research shows that there is a 36% chance of a college freshman needing to take a co-requisite mathematics class.