EXERCISES 11.2

1. The owner of a new apartment building must install 25 water heaters. A certain brand is guaranteed for 5 years, but the probability that it will last 10 years is 0.25. What is the approximate probability that 8 or more of the hot water heaters will last at least 10 years?
2. From many years of observation, a biologist knows that the probability is only 0.65 that any given Arctic tern will survive the migration from its summer nesting area to its winter feeding grounds. A random sample of 500 Arctic terns were banded at their summer nesting area. What is the approximate probability that between 310 and 340 of the banded Arctic terns will survive the migration?
3. A professor is giving an exam to a class of 200 students. From past semesters, he knows that60% of students taking this course receive at least a 70% on this exam. What is the probability that at least 130 of his students will receive a 70% on the test?
4. You flip a weighted coin 10 times (it gives tails 30% of the time, and heads 70%). What is the probability that you will receive at least 9 heads?
5. Data recorded over recent years show that one in every fifty male adults develops a serious respiratory illness.(a)In a random sample of n= 400 male adults, find, using results for a binomial distribution, the mean and standard deviation of the number who will suffer from this respiratory illness.(b)A random sample of 400 workers in a certain occupation shows 15 with the respiratory illness. Find, using the normal approximation to the binomial distribution, the probability that 15 or more ina sample of 400 will suffer from the respiratory illness. What conclusion do you draw from this probability?
6. 2% of all births in New Zealand are twins. If there are 500 births in one week, calculate the following:(a)The probability that more than 10 births in one week would result in twins.(b)The probability that at least 5 births result in twins.
7. The probability that a new restaurant in Christchurch fails in the first year of operation is 0.1. If 15 new restaurants are sampled, use Normal approximation to calculate the probability that more than 5 out of the 15 fail.

Answers

1. 0.2810
2. 0.8530
3. 0.0853
4. 0.1493
5. a)8; 2.8; b)0.0102
6. a)0.4364; b)0.9608
7. 0.00029