

MATHEMATICS 201-510-LW

Business Statistics

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IX – Binomial Distribution

- Which of the following are binomial experiments? Explain why.
 - Rolling a die many times and observing the number of spots.
 - Rolling a die many times and observing whether the number obtained is even or odd.
 - Drawing 3 balls with replacement from a box that contains 10 balls, 6 of which are red and 4 are blue, and observing the colors of the drawn balls.
 - Drawing 3 balls without replacement from a box that contains 10 balls, 6 of which are red and 4 are blue, and observing the colors of the drawn balls.
- From previous experience, a car insurance company has established that 12% of its new clients will submit a claim during their first year with the company. On a certain day, 6 new clients signed with the company for insurance.
 - Find the probability distribution
 - Draw the probability histogram.
 - Find the mean and standard deviation for this distribution.
 - What is the probability that less than half of the new clients will submit a claim during the next year?
 - What is the probability that more than half of the new clients will submit a claim during the next year?
- The percentage of Canadians who say they would marry the same woman if they had to do it all over again is 80%. The percentage of women who say they would marry the same men again is 50%.
 - What is the probability that in a group of 10 married men, at least seven will claim that they would marry the same women again?
 - What is the probability that less than half will say this?
 - What is the probability that in a group of 10 married women, at least seven will claim that they would marry the same women again?
 - What is the probability that less than half will say this?
- According to an article which appeared in *The Gazette*, about 60% of all Canadian households have cellular phones. Suppose that you are conducting a survey of customer satisfaction regarding cellular phones. If you called 11 households selected at random, what is the probability that
 - every household has at least one cellular phone?
 - more than 4 households have cellular phones?
 - fewer than 5 do not have cellular phones?
 - more than 7 do not have cellular phones.

5. Approximately 75% of all marketing personnel are extroverts, whereas about 60% of all computer programmers are introverts.
 - a) At a meeting of 15 marketing personnel, what is the probability that 10 or more are extroverts?
 - b) What is the probability that 5 or more are extroverts?
 - c) What is the probability that all are extroverts?
 - d) At a meeting of 5 computer programmers, what is the probability that none are introverts?
 - e) What is the probability that 3 or more are introverts?
 - f) What is the probability that all are introverts?
6. According to Statistics Canada, 23% of adult Canadians aged 25 to 64 have a Bachelor's degree or higher. If 15 Canadians are selected at random what is the probability that less than three of them have a Bachelor's degree or higher.
7. In a recent poll, 52% of the adults said they were "very concerned" about the Canada's current economic situation. Assuming that this result holds true for the current population of all Canadians, find the probability that in a random sample of 10 adults the number who share this concern is
 - a) exactly 4
 - b) none
 - c) exactly 8
8. The probability that a student obtains a grade over 80% in a math exam is 0.7. If the exam is given to nine students, find the probability that more than half the class will get over 80%.
9. Eight percent of the students studying in business in a University are at least 30 years old.
 - a) If 40 students are selected at random, find the probability that between 2 and 4 students, inclusively, are at least 30 years old.
 - b) If 175 new students are accepted in business, how many should you expect to be at least 30 years old?
10. Find the mean and standard deviation of x for each of the following binomial random variables.
 - a) the number of tails seen in 50 tosses of a quarter.
 - b) The number of aces seen in 100 draws from a well-shuffled deck of cards (with replacement).
 - c) The number of cars found to have unsafe tires among the 400 cars stopped at a road-block for inspection. Assume that 6% of all cars have one or more unsafe tires.
 - d) The number of melon seeds that germinate when a package of 50 seeds is planted. The package states that the probability of germination is 0.88.
11. A binomial variable has a mean equal to 200 and a standard deviation of 10. Find the values of n and p .
12. If only $2/3$ of the applicants in economics are accepted, how many do you expect to be accepted if there are 350 applications?

