1. Compute the probability of X successes, using the binomial formula.
    a. n = 5, X = 2, p = 0.025
    b. n = 12, X = 6, p = 0.45
    c. n = 6, X = 0, q = 0.35
    d. n = 45, X = 10, p = 0.25
    e. n = 22, X = 20, p = 0.68

2. Determine in which of the following situations a binomial distribution can be applied. If so, state and graph the distribution of X, and find the mean and standard deviation of X. If not, state which of the four conditions to satisfy the binomial distribution requirements has been violated.
    a. Linda is interested in toilet paper pulling preferences. She takes a simple random sample of 5 people and asks each whether they always pull from the top or not. The probability that a person pulls from the top is 0.53, and X= the number of people who pull from the top.
    b. I roll a fair, 6-sided die until I get a two. X is the number of rolls it takes before I obtain a roll of two.
    c. You have a bag containing 4 red chips and 6 white chips and you draw 4 chips. Let random variable Y be the number of red chips drawn from the bag out of 4 draws without replacement.

3. Compute the probability of X successes given n = 12 and p = 0.45 using the binomial formula.
    a. P(X = 6)
    b. P(X>9)
    c. P(X<4)
    d. P(4<X<7)
    e. P(5<X<7)

4. A student randomly guesses at 10 multiple choice questions. Each question has four possible answers with only one being correct, and each is independent of every other question.
    a. Find the probability that the student guesses EXACTLY 4 correct.
    b. Find the probability of guessing less than 3 correctly.
    c. Find the probability of guessing more than 8 correctly.
    d. Find the probability of guessing between 4 and 6 inclusively.

5. In a Gallop Poll conducted January 30 – February 2, 2008, 43% of 18-29 year olds said that they were worried about retirement. Find the probability that out of 15 college students ages 18 – 19:
    a. Exactly 1 worried about retirement.
    b. Fewer than 5 worried about retirement.
    c. At least 10 worried about retirement.
    d. Between 8 and 10 inclusively are worried about retirement.

6. In a Gallop Poll, 35% of 30-49 year olds stated they believe in ghosts. Find the probability that out of 16 college students aged 30 – 49:
    a. Exactly 5 said they believed in ghosts.
    b. Exactly 5 said they do not believe in ghosts.
    c. At least 4 believe in ghosts.
    d. At least 4 do not believe in ghosts.

7. A manufacturer of electronics components produces precision resistors designed to have a tolerance of ±1%. From quality-control testing, the manufacturer knows that about one resistor in six is actually within just 0.3% of its nominal value. A customer needs two of these more precise resistors. What is the probability of finding exactly two such resistors among the first four tested?

8. Paula moves to an area with a different telephone exchange. Telephone numbers in the new exchange start with 753, and all combinations of the four remaining digits are equally likely.
    a. Calculate the probability that the last four digits in Paula's new telephone number are even.
    b. What is the expected number of even digits in her new telephone number?

9. The Choco-Latie Candies company makes candy-coated chocolates, 40% of which are red. The production line mixes the candies randomly and packages ten per box.
    a. What is the probability that less than four candies in a given box are red?
    b. What is the probability that at least four candies in a given box are red?
    c. Describe a second way of finding the answer to part b).

10. A student writes a five question multiple-choice quiz. Each question has four possible responses. The student guesses at random for each question. Calculate the probability for each possible score on the test from 0 to 5.

11. Suppose that 65% of the families in a town own computers, If ten families are surveyed at random,
    a. what is the probability that at least five own computers?
    b. what is the expected number of families that own computers?

12. Ninety percent of a country's population are right-handed.
    a. What is the probability that exactly 29 people in a group of 30 are right-handed?
    b. What is the expected number of right-handed people in a group of 30?
    c. Design a simulation to show that the expectation calculated in part b) is accurate.

13. Suppose that Bayanisthol, a new drug, is effective for 65% of the participants in clinical trials. If a group of fifteen patients take this new drug,
    a. what is the expected number of patients for whom the drug will be effective?
    b. what is the probability that the drug will be effective for less than half of them?

14. Jason knows that his favourite player on the Raptors basketball team scores on 83% of his free-throw attempts. Since 10 0.83 = 8.3, Jason expects that in ten attempts this player will score eight times.
    a. Is Jason's reasoning correct? Explain why or why not.
    b. Is the player more likely to score exactly eight times or not to score exactly eight times?

15. One type of jet engine has a 0.0001 probability of failure while in flight. For a jet that has four of these engines, what is the probability of at least two of them failing?

16. A small math class consists of 16 students. What is the probability that the difference in the number of male and female students in the class is greater than 4?

17. There are 10 members on a committee. The probability of any member attending a randomly chosen meeting is 0.9. The committee cannot do business if more than 3 members are absent. What is the probability that 7 or more members will be present on a given date?

18. A school fills each of its Grade 9 mathematics classes with 22 students. Assume that the likelihood of a male or female being given a place in a class is equal. Design a simulation that could be used to model the distribution of males and females in these classes.

19. A baseball player has a batting average of 0.350. Compare the expected value for his number of hits in a game with 6 at bats to the probability of the number of hits he is most likely to get.

20. A soccer linesman will make the correct call for a possible offside pass 90% of the time. What is the probability that he will make 2 or fewer incorrect calls in a game in which he sees 32 passes?

21. In a history class, Colin and Diana both write a multiple choice quiz. There are 10 questions. Each question has five possible answers. What is the probability that:
    a. Colin will pass the test if he guesses an answer to each question.
    b. Diana will pass the test if she studies so that she has a 75% chance of answering each question correctly.

22. The manufacturing sector contributes 17% of Canada's gross domestic product. A customer orders 50 components from a factory that has a 99% quality production rate (99% of the products are defect-free). Find the probability that:
    a. none of the components in the order are defective;
    b. there is at least one defective product in the order.
    c. There are at least two defective products in the order.

23. The probability the Tim will sink a foul shot is 70%. If Tim attempts 30 foul shots, what is the probability that:
    a. he sinks exactly 21 shots
    b. he sinks at least 21 shots
    c. he sinks at most 21 shots
    d. he sinks between 18 and 20 shots, inclusive.

24.

1 If $X \sim B(n, 0.6)$ and $P(X < 1) = 0.0256$, find n.

2 1% of fuses in a large box of fuses are faulty. What is the largest sample size that can be taken if the probability that there are no faulty fuses in the sample must be greater than 0.5?

3 If $X \sim B(n, 0.2)$ and $P(X \geq 1) > 0.75$, find the least possible value of n.

4 The probability that Anna scores a penalty goal in a hockey competition is 0.3. Find the least number of attempts that she would need to take if the probability that a goal is scored at least once is greater than 0.95.

5 How many times must an unbiased coin be tossed so that the probability that at least one tail will occur is at least 0.99?

25. http://olga-sediako.wikispaces.com/file/view/Worksheet+Binomial+Distribution+Problems.pdf