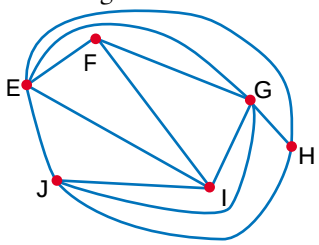
1. If the probability of rain tomorrow is 40%, what are the odds

a) that it will rain?

b) that it will not rain?

2. Describe each field you would include in a database for scheduling deliveries by an appliance dealer.

3. **a)** List the vertices of odd-degree in the following network.



b) Is this network

i) complete? **ii)** traceable? **iii)** planar?

4. At Burger Barn, a combination meal consists of a hamburger and any two side orders, which can be soup, French fries, onion rings, coleslaw, pie, or ice cream. How many combination meals are possible?

5. Make a table of the probability distribution for the days of the month in a leap year.

6. **a)** What is a Bernoulli trial?

b) What is the key difference between trials in a geometric probability distribution and those in a hypergeometric probability distribution?

7. Marc is making change for a $5 bill.

a) List the ways he can provide change using only $1 and $2 coins.

b) How many ways can he make change using only $1 coins and quarters?

c) Would the number of ways be the same if he used only $2 coins and quarters? Explain your reasoning.

d) How many ways can he make change using only $1 coins, $2 coins, and quarters?

8. Give an example of each of the following sampling techniques and list an advantage of using each type.

a) stratified sample

b) simple random sample

c) systematic sample

9. In the fairy tale Rumplestiltskin, the queen must guess the name *Rumplestiltskin*.

a) If she knows only what letters are in the name, how many different guesses could she make?

b) At one guess per minute, how long would it take to try all the possible arrangements?

10. A survey asked randomly chosen movie fans how many videos they rented in the last month.

Number of Videos	Frequency
0–1	2
2–3	5
4–5	17
6–7	24
8–9	21
10–11	9
12–13	1

a) Estimate the mean and median number of videos rented by those surveyed.

b) Draw a histogram and relative frequency polygon for the data.

c) Discuss any sources of inaccuracy in your calculations.

11. A group of data-entry clerks had the following results in a keyboarding test:

Speed (words/min)	44	62	57	28	46	71	50
Number of Errors	4	3	3	5	11	2	4

a) Create a scatter plot and classify the linear correlation.

b) Determine the correlation coefficient and the equation of the line of best fit.

c) Identify the outlier and repeat part b) without it. Use calculations and a graph to show how this affects the strength of the linear correlation and the line of best fit.

d) What does your analysis tell you about the relationship between speed and accuracy for this group of data-entry clerks?

12. A shopper observes that whenever the price of butter goes up, the price of cheese goes up also. Can the shopper conclude that the price of butter causes the increase in the price of cheese? If not, how would you account for the correlation in prices?

13. A market research company has a contract to determine the percent of adults in Ontario who want speed limits on expressways to be increased. The poll's results must be accurate within ±4%, 19 times in 20.

a) If a small initial sample finds opinions almost equally divided, how many people should the company survey?

b) Suggest a sampling method that would give reliable results.

14. How many ways can a bank of six jumpers on a circuit board be set if

a) each jumper can be either on or off?

b) each jumper can be off or connect either pins 1 and 2 or pins 2 and 3?

15. How many arrangements of the letters in the word *mathematics* begin with a vowel and end with a letter other than *h*?

16. In 2001, 78 books were nominated for the $25 000 Giller Award for Canadian fiction. How many different shortlists of 6 finalists could the jury select?

17. A marketing survey of consumers' soft-drink preferences collected the following data:

- 75 liked cola, 65 liked ginger ale, and 32 liked spring water.
- 43 liked cola and ginger ale.
- 13 liked cola and spring water.
- 15 liked ginger ale and spring water.
- 7 liked all three and 12 liked none of them.

a) How many people were surveyed?

b) How many liked only ginger ale?

c) How many liked only spring water and ginger ale?

d) How many liked only one of the choices?

e) How many liked exactly two of the choices?

18. In how many ways can a box of 18 different chocolates be evenly distributed among three people?

19. Use Pascal's triangle to

a) expand $\left(\frac{x}{3} + 3y\right)^5$

b) develop a formula expressing the sum of the first n natural numbers in terms of combinations

20. Naomi's favourite cereal includes a free mini-puck with the emblem of one of the 30 NHL hockey teams. If equal numbers of the different pucks are randomly distributed in the cereal boxes, what is the probability that Naomi will get a mini-puck for one of the 6 original NHL teams in any given box of cereal?

21. Steve has a bag containing five red, three green, six orange, and ten black jelly beans. Steve's favourites are the black licorice ones. He randomly selects eight jelly beans.

a) What is the probability that he will have at least four black ones?

b) What is the expected number of black jelly beans?

22. Of the 24 guests invited to Hannah's party, 12 are male and 15 have dark hair. If 7 of the females have dark hair, what is the probability that the first guest to arrive will either have dark hair or be a male?

23. When testing its new insect repellant, a company found that 115 people out of an experimental group of 200 got fewer than the mean number of mosquito bites reported by the 100 people in the control group. Is this evidence sufficient for the company to claim that its spray is effective at a

a) 5% significance level?

b) 99% confidence level?

24. A particular car dealer's records show that 16.5% of the cars it sold were red.

a) What is the probability that the first red car sold at the dealership on a given day will be the fifth car sold that day?

b) What is the probability that the first red car sold will be among the first five cars sold?

c) What is the expected waiting time before a red car is sold?

25. A town has three barbeque-chicken restaurants. In the past year, UltraChicken lost 20% of its customers to Churrasqueira Champion and 15% to Mac's Chicken, Churrasqueira Champion lost 10% of its customers to each of its two competitors, and Mac's Chicken lost 25% of its customers to UltraChicken and 30% to Churrasqueira Champion.

a) Predict the long-term market share for each of these three restaurants.

b) What assumptions must you make for your solution to part a)?

26. A battery maker finds that its production line has a 2.1% rate of defects.

a) What is the probability that the first defect found will be in the 20th battery tested?

b) What is the probability that there are no defects in the first 6 batteries tested?

c) What is the expected waiting time until a defective battery is tested?

27. Explain the difference between a leading question and a loaded question.

28. During the winter, 42% of the patients of a walk-in clinic come because of symptoms of the common cold or flu.

a) What is the probability that, of the 32 patients on one winter morning, exactly 10 had symptoms of the common cold or flu?

b) What is the expected number of patients who have symptoms of the common cold or flu?

29. The Ministry of Natural Resources is concerned that hunters are killing a large number of wolves that leave the park to follow deer. For this reason, the Ministry is considering a permanent ban on wolf hunting in the area bordering the park. Outline the data and statistical analysis that you would require to determine whether such a ban is justified.