1. Let $A = \begin{bmatrix} 7 & 3 \\ 0 & -2 \\ -5 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 8 & 1 \\ -5 & 4 \end{bmatrix}$, and

$C = \begin{bmatrix} -8 & 0 \\ 5 & 6 \\ 9 & -3 \end{bmatrix}$. Calculate, if possible,

a) $-2(A + C)$ **b)** AC

c) $(BA)^t$ **d)** B^2

e) C^2 **f)** B^{-1}

2. a) Describe the iterative process used to generate the table below.

b) Continue the process until all the cells are filled.

17	16	15	14	13	
18	5	4	3	12	
	6	1	2	11	
	7	8	9	10	

3. Which of the following would you consider to be databases? Explain your reasoning.

a) a novel

b) school attendance records

c) the home page of a web site

d) an advertising flyer from a department store

4. What sampling techniques are most likely to be used for the following surveys? Explain each of your choices.

a) a radio call-in show

b) a political poll

**c)** a scientific study

5. Classify the type of linear correlation that you would expect for each pair of variables.

a) air temperature, altitude

b) income, athletic ability

c) people's ages from 1 to 20 years, their masses

d) people's ages from 21 to 40 years, their masses

6. Identify the most likely causal relationship between each of the following pairs of variables.

a) grade point average, starting salary upon graduation

b) grade in chemistry, grade in physics

c) sales of symphony tickets, carrot harvest

d) monthly rainfall, monthly umbrella sales

7. a) Sketch a map that can be coloured using only three colours.

b) Reconfigure your map as a network.

8. State whether each of the following networks is

i) connected **ii)** traceable **iii)** planar

Provide evidence for your decisions.

a)

b)
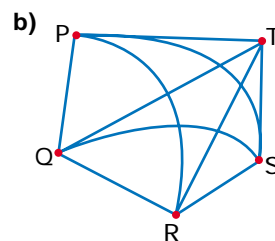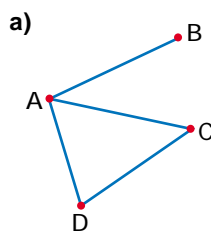
9. Use a tree diagram to represent the administrative structure of a school that has a principal, vice-principals, department heads, assistant heads, and teachers.

10. A renowned jazz pianist living in Toronto often goes on tours in the United States. For the tour shown below, which city has the most routes

　　a) with exactly one stopover?

　　b) with no more than two stopovers?
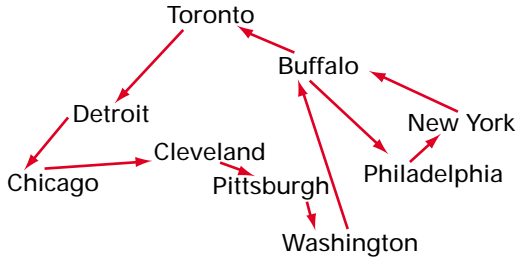
11. The following are responses to a survey that asked: "On average, how many hours per week do you read for pleasure?"

1 3 0	0 7 2 0 1 10 5 2 2	2 0 1 4 0 8 3	1 3
0 0 2 15	4 9 1 6	7 0 3 3 14	5 7 0 1	1 0 10 0

Use a spreadsheet to

　　a) sort the data from smallest to largest value

　　b) determine the mean hours of pleasure reading

　　c) organize the data into a frequency table with appropriate intervals

　　d) make a histogram of the information in part c)

12. The annual incomes of 40 families surveyed at random are shown in the table.

Income ($000)						
28.5	38	61	109	42	56	19
27	44.5	81	36	39	51	40.5
67	28	60	87	58	120	111
73	65	34	54	16.5	135	70.5
59	47	92	38	55	84.5	107
71	59	26.5	76	50		

　　a) Group these data into 8 to 12 intervals and create a frequency table.

　　b) Create a histogram and a cumulative-frequency diagram for the data.

　　c) What proportion of the families surveyed earn an annual income of $60 000 or less?

13. Classify the bias in each of the following situations. Explain your reasoning in each case.

　　a) At a financial planning seminar, the audience were asked to raise their hands if they had ever considered declaring bankruptcy.

　　b) A supervisor asked an employee if he would mind working late for a couple of hours on Friday evening.

　　c) A survey asked neighbourhood dog-owners if dogs should be allowed to run free in the local park.

　　d) An irascible talk show host listed the mayor's blunders over the last year and invited listeners to call in and express their opinions on whether the mayor should resign.

14. The scores in a recent bowling tournament are shown in the following table.

150	260	213	192	176	204	138	214	298	188
168	195	225	170	260	254	195	177	149	224
260	222	167	182	207	221	185	163	112	189

　　a) Calculate the mean, median, and mode for this distribution. Which measure would be the most useful? Which would be the least useful? Explain your choices.

　　b) Determine the standard deviation, first quartile, third quartile, and interquartile range.

　　c) Explain what each of the quantities in part b) tells you about the distribution of scores.

　　d) What score is the 50th percentile for this distribution?

e) Is the player who scored 222 above the 80th percentile? Explain why or why not.

15. The players on a school baseball team compared their batting averages and the hours they spent at the batting practice.

Batting Average	Practice Hours
0.220	20
0.215	18
0.185	15
0.170	14
0.200	18
0.245	22
0.230	19
0.165	15
0.205	17

a) Identify the independent variable and dependent variable. Explain your choices.

b) Produce a scatter plot for the data and classify the linear correlation.

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

d) Use this linear model to predict the batting average for players who had batting practice for

    i) 16 h   **ii)** 13 h   **iii)** 35 h

e) Discuss how accurate you think each of these predictions will be.

16. Describe a method you could use to detect outliers in a sample.

17. A bright, young car salesperson has made the following gross sales with her first employer.

Year	Gross Sales ($ millions)
1997	0.8
1998	1.1
1999	1.6
2000	2.3
2001	3.5
2002	4.7

a) Create a time-series graph for these data.

b) Based on this graph, what level of sales would you predict for 2003?

c) List three factors that could affect the accuracy of your prediction.

d) Compute an index value for the sales each year using the 1997 sales as a base. What information do the index values provide?

e) Suppose that this salesperson is thinking of changing jobs. Outline how she could use the sales index to convince other employers to hire her.

18. The following time-series graph shows the Consumer Price Index (CPI) for the period 1971 to 2001.
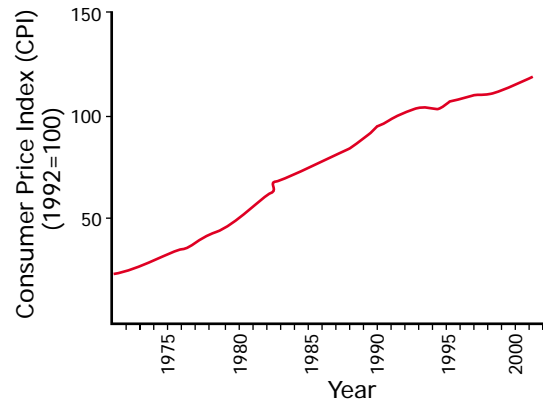
a) What is the base for this index? When did the CPI equal half of this base value?

b) Approximately how many times did the average price of goods double from 1971 to 1992?

c) Which decade on this graph had the highest rate of inflation? Explain your answer.

d) Estimate the overall rate of inflation for the period from 1971 to 2001.