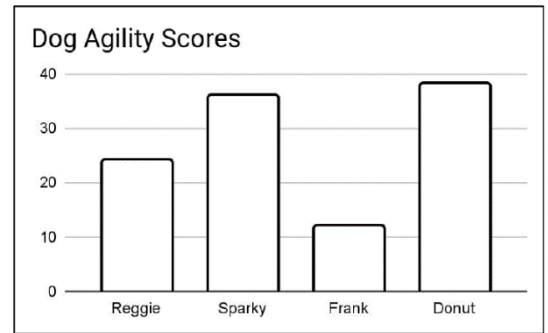


3.2 HOMEWORK HANDOUT: MATHEMATICAL MODELS

PART A

1. Lauren is trying to decide which dog she should take to an agility competition. The graph below shows data from the previous competition.

- According to the data which dog should go to the championship?
- What was the highest score?
- State 3 other pieces of information that might affect Lauren's decision that are not displayed in the graph?



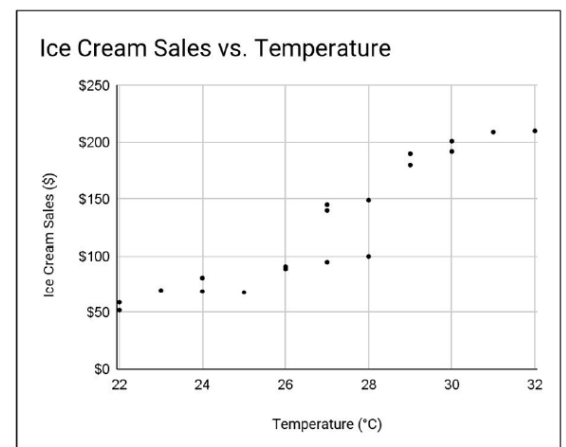
2. The data presented in the chart below shows the unemployment rate for 5 provinces for 2019 and for 2020.

Province	% Unemployed (2019)	% Unemployed (2020)
British Columbia	4.7	8.9
Alberta	7.0	11.4
Saskatchewan	5.6	8.4
Manitoba	5.3	8.0
Ontario	5.6	9.6

- Which province had the highest unemployment rate in each year? What was the rate?
- Which provinces had the biggest change in their unemployment rate from 2019 to 2020? What was the change?
- Who (people/agencies) might need to know the unemployment rate?
- If you were looking for work and able to relocate, what province would you move to based on this data? What other information would be important for you to know before deciding to move?
- Suggest at least 3 reasons for the rise in the unemployment rate from 2019 to 2020.

3. The data presented in the graph below shows ice cream sales for different temperatures.

- Who would find this data useful?
- What conclusion can you make about the effect of temperature on ice cream sales based on this data?
- If you owned the ice cream shop, could you rely on this data to predict sales throughout the summer? Why or why not?
- What other information would you want to know in order to accurately make predictions using this data?



4. Read this article about the housing "bubble" in Canada in 2021.

Canadian Housing

The Canadian Real Estate Association (CREA) is an organization that represents real estate agents across Canada. In a recent news report, CREA published interesting information regarding Canada's housing prices.



CREA collects data from the Canadian MLS® Systems, which is a large database of real estate listings across Canada. By collecting data from this system, CREA is able to analyze home sales, new listings, supply and demand, and national averages.

In July 2021, the average Canadian housing prices are up 38% compared to the previous year. However, these prices have dropped from last March. The average house price in July 2021 is \$688,000. This is down from \$696,000 in April and \$716,000 in March this year. Despite this small decline, the Canadian housing market is still continuing to boom.

New Brunswick has seen the most significant house price decline of 7% since March 2021. Ontario has had a smaller decline of 2.59%. Newfoundland and Labrador is an exception to this decline. This region has seen a price increase of 9.16%.

The housing market has boomed ever since the beginning of the Covid-19 pandemic. The cities that were most heavily impacted were the small and midsize cities outside of Toronto. Despite this significant increase, the number of home sales has dropped by 11% from March 2021 to July 2021.

The 38% year-over-year increase has had a profound impact on the housing market. Many Canadians wishing to buy homes have now been outpriced by the market and can no longer afford to purchase a home.

- a) Who is responsible for collecting this data? Why do you think they collect it?
- b) Name 3 different people/groups who would be interested in tracking and reading this data. Why would they want this information?
- c) What type of graphs/charts could the author of this article use to display the data in a format that is easier for the reader to use?
- d) Suggest 2 reasons why the average house price increased in the spring of 2021.
- e) Suggest 2 reasons why the number of home sales dropped during the same period.
- f) What does "outpriced by the market" mean? Why is the impact greatest for first-time home buyers?

ANSWERS

1) a) Donut b) 39 c) answers will vary; health of dog, reasons other dogs didn't do as well last time (sick, etc.), ease of handling, cost, etc.

2) a) 2019 Alberta 7%, 2020 Alberta 11.4%

b) Alberta, went up 4.4%

c) answers can vary; businesses trying to hire, social services, schools, real estate, retail businesses, cities- taxes

d) Manitoba-lowest in 2020 and 2nd lowest in 2019; what types of jobs are available, location, cost of living, salaries, weather, housing prices, housing availability

e) Covid restrictions, border closing, tensions/restrictions with trading partners, changes in industry demands, etc.

3) a) businesses that sell ice cream, suppliers, restaurants

b) when the temperature increases, ice cream sales increase

c) you could use it to predict the general trend, but it may also depend on other factors not presented in the data

d) weather (rain or shine), location of sales, overlap with vacation times (dates), special promotions, groups that increased sales, etc.

4) a) Canadian Real Estate Association – to track trends in sales to report to businesses and consumers

b) potential home buyers, potential home sellers, people looking to locate/open a business, cities to predict property tax income, etc.

c) average home price in a double bar graph or chart would make it easier to see/find the data and compare different months

d) people relocated because they were allowed to work from home (moved out of big cities), more cottage properties sold, pandemic resulted in people wanting to make changes, etc.

e) prices were too high for some people to afford a new house, job losses and unemployment increased during the same period resulting in fewer people being able to commit to a new home purchase, etc.

f) salaries did not increase at the same rate as housing prices, so people could not afford to buy a house. First time buyers who couldn't afford a mortgage were forced to continuing renting and not be able to start to build equity in their home.