

Applied Mathematics 30

**Student Project:
Canada Winter Games**



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Project—Canada Winter Games

Introduction

The Canada Games are held every two years, alternating summer and winter. You and a friend live in Red Deer and are planning to take a trip to the 2011 Canada Winter Games in Halifax, N.S. You will need to estimate the total cost of the trip so that you can plan your savings accordingly.

Part A

You and your friend will drive to Edmonton or Calgary and then fly to Halifax. You will return to the same city to pick up your vehicle for the drive home. Because you are not sure what you will be doing in 2011, you are only planning a weekend trip—leaving either Thursday night after work or school or any time on Friday and returning Monday—to ensure that you can be at work or school on Thursday and Tuesday. The possible flights and their respective costs are shown below.

	Price (\$) Not including taxes, fees, and surcharges	Departure Time (local time)	Route	Arrival Time (local time)
To Halifax	304.00	12:50	Edmonton Halifax	22:10
	239.00	15:10	Edmonton Toronto (stopover) Halifax	01:49 (next day)
	304.00	22:55	Calgary Halifax	06:35 (next day)
	437.00	09:55	Calgary Toronto (stopover) Halifax	19:34
	279.00	16:15	Calgary Toronto (stopover) Halifax	01:49 (next day)
From Halifax	304.00	06:55	Halifax Edmonton	11:18
	263.00	05:55	Halifax Toronto (stopover) Edmonton	10:25
	304.00	07:25	Halifax Calgary	10:10
	273.00	15:30	Halifax Toronto (stopover) Calgary	20:34
	279.00	17:20	Halifax Toronto (stopover) Calgary	23:00

Current taxes, fees, and surcharges apply to all round-trip flights.	
Fees	AIF – Airport Improvement Fee, to a maximum of \$33.00
Surcharges	INS—Insurance charge, to a maximum of \$6.00 ATSC—Air Travellers Security Charge, to a maximum of \$10.00 NAV—Navigation charge, to a maximum of \$136.00
Taxes	GST – Goods and Services Tax, 5% of total charge

1. Draw the transportation network for each possible flight on the map below.



2.
 - Use the flight information to complete a 3×3 matrix M to represent the number of one-way direct flights to and from Halifax.
 - Use the flight information to write a 3×3 matrix N that represents the number of one-way flights to and from Halifax that go through Toronto.
 - Calculate $M + N$. Explain what the resulting matrix represents.
3.
 - How many different round-trip flight plans to Halifax are possible? Justify your answer by making reference to specific elements in your matrices.
 - Which flights will you choose? Justify your response.
4. Determine the amount you should budget for your flights to Halifax and back. Use the maximum fees and surcharges in your calculation (see chart).
5. How many more round-trip flight plans to Halifax are possible if you can depart from one city and return to the other city?

Part B

You have researched the cost of daily and weekly passes for the last four Canada Games, as shown in the table below.

Canada Games	Cost of a Daily Pass	Cost of a Weekly Pass
2001 London, ON	\$8	\$30
2003 Bathurst, NB	\$10	\$30
2005 Regina, SK	\$16	\$45
2007 Whitehorse, YT	\$20	\$50

- Write a regression equation that best models the cost of a daily pass over time and a regression equation that best models the cost of a weekly pass over time. Justify your choices of regression equations.
 - Use your regression equations to predict the cost of a daily pass in 2011 and the cost of a weekly pass in 2011.
- Which prediction do you consider more reliable for budgeting—the cost of a daily pass or the cost of a weekly pass? Justify your answer.
 - Calculate the amount you should budget for event passes, including 13% Harmonized Sales Tax (HST), to attend the Canada Games events on Saturday and Sunday.

Part C

Your friend has researched the cost of hotels in Halifax and collected the data shown below.

Hotel	Star Rating	Price/Room (based on double occupancy, taxes not included)
Quality Inn Halifax Airport	★★	\$141.00
Courtyard Marriott	★★★	\$89.00
Marriott Halifax Harbourfront	★★★★	\$160.00
Lord Nelson Hotel	★★★	\$122.00
Citadel Halifax Hotel	★★★	\$115.00
Comfort Inn	★★	\$85.00
Radisson Suite Hotel	★★★	\$149.00
Quality Inn and Suites	★★	\$121.00
Holiday Inn Express	★★★	\$93.00
Westin Nova Scotian	★★★	\$109.00
Delta Halifax	★★★	\$129.00
Delta Barrington	★★★	\$129.00
Holiday Inn Select	★★★	\$105.00
Prince George Hotel	★★★★	\$211.00
Cambridge Suites	★★★	\$160.00
Waverly Inn	★★★	\$125.00
Old Orchard Inn	★★★	\$75.00
Four Points by Sheraton Halifax	★★★	\$160.00
Haliburton	★★★	\$185.00
Residence Inn	★★★	\$139.00
Best Western Halifax Chocolate	★★	\$99.00
Commons Inn	★	\$100.00
Bayview Motor Inn	★★★	\$85.00
Inn on the Lake	★★★	\$119.00

1. Calculate the mean and standard deviation of the cost per night for hotel accommodations. Describe the information provided by the standard deviation.
2. You and your friend will share a hotel room during your trip. Using the mean cost for hotel accommodations, calculate the total amount per person that you should budget for accommodations, including 13% HST and 2% Hotel Tax.
3. Other costs for the trip, such as food, transportation to the venues, souvenirs, etc., are estimated to be \$225.00 per person. Use the information from parts A and B of this project and the average cost of a hotel room to calculate the total amount per person that you should budget for your trip.
4. Starting in June 2009, you plan to save some money each month to pay for your trip. Your friend has researched interest rates and discovered that you will likely earn only 2.5%/a, compounded monthly, on money invested for less than two years. Design a spreadsheet to determine the minimum amount you will need to deposit at the beginning of each month to save the amount budgeted for the trip by February 2011. Supply two printouts—one printout showing the results of the calculations and the other printout showing the formulas in the cells.

Part D

You and your friend plan to attend a preliminary-round hockey game and a snowboarding event that take place on the same day.

1.
 - During the preliminary round, the lengths of the hockey games are normally distributed. The average length of a hockey game is 2 hours and 19 minutes with a standard deviation of 5.2 minutes. Sketch and label a normal distribution curve that models the lengths of the hockey games within 3 standard deviations of the mean.
 - Determine the probability that the hockey game you attend will last between 128 minutes and 143 minutes.

2.
 - The hockey game you will be attending is scheduled to start at 10:00 A.M., and the snowboarding event is scheduled to start at 2:00 P.M. Determine the length of time below which 98% of the hockey games will last, and then calculate how much time you will have to travel from the hockey game to the snowboarding event.
 - Every 15 minutes, a shuttle bus leaves the hockey arena and travels to the snowboarding venue. The one-way trip takes 60 minutes. Will you be able to arrive at the snowboarding event on time? Justify your answer.

Part E

Select one sport that is currently on the program of the summer or winter Canada Games. A complete list of sports can be found at www.canadagames.ca under “Sport Profiles”.

1. In which year was this sport first included in the Canada Games? Describe any trends in provincial results for this sport since its inclusion in the Canada Games. Describe the historical results of the Alberta team in this sport.
2. To be part of the Alberta team for the Canada Games, each sport has eligibility requirements. What is the maximum number of athletes on the Alberta team who can compete in the sport of your choice? Describe the eligibility requirements for athletes who will compete in this sport. Explain why there are minimum and maximum eligibility requirements.
3. Several athletes use the Canada Games as training and development for future Olympic Games. Analyze the history of athletes who have competed in the Canada Games and have subsequently competed in the Olympic Games.
4. The Canada Games have played a role in the development of some premier athletes in Canada. Identify one elite Canadian athlete who competed in the Canada Games, the year in which that athlete competed, and his or her sport of choice. Describe the success the athlete has had in his or her sport since competing in the Canada Games.

The following websites may help in your research:

www.canadagames.ca

http://en.wikipedia.org/wiki/Canada_Games

<http://tpr.alberta.ca/recreation>

www.coach.ca

www.sirc.ca

www.gnb.ca/0131/performance-e.asp

Note: Website addresses sometimes change. If the websites listed above are not available, use a search engine and type in keywords such as those listed below:

“Canada games”

“Alberta athletics”

“Olympic athletes”