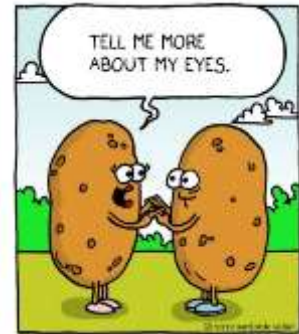


MBF 3C **Activity: Modelling with Exponential Relations**Day 1**Learning Goals:**

- to collect data that can be modelled (graph) by an exponential relation
- to collect secondary data from a source like Statistics Canada
- to solve a real-world application by graphing data using technology

**Introduction:**

In Part A of this activity, you'll be exploring the Statistics Canada website to collect secondary data on the "Farm Value of Potatoes", in Canada, over a specified period of time.

Once the data is collected, you'll have the opportunity to import the data into some statistics software (e.g., Fathom, Excel) and to generate an exponential curve of best fit.

With a curve of best fit, you'll then be able interpolate ("read within the data") and/or extrapolate ("read beyond the data") values to solve problems about the "Farm Value of Potatoes" using your knowledge of exponential growth and decay.

**Resources:**

To assist you in navigating Statistics Canada and using statistics software, video instructions have also been created to supplement what's written here.

Video 1 (Statistics Canada):

Video 2 (Using Fathom Statistical Software):

**Activity:****1-Navigating Statistics Canada and Mining for Data**

- Go to <http://www.statcan.gc.ca/start-debut-eng.html>.
- Scroll down to the lower right side of the screen and click on CANSIM →
- Search CANSIM (database) for "potato" (see below).

**Search CANSIM**

Enter your search terms, CANSIM table or series number(s)

All of these words ▾

Features
2016 Census jobs
Business & Community Newsletter
CANSIM
Census Program
Custom surveys and services
Health in Canada
Infographics
Information for survey participants
Workshops, training and conferences

- Click on Table 001-0014.

Title	Description	Table
Area, production and farm value of potatoes, annual, 1908 to 2015	<a href="#">Description</a>	<a href="#">001-0014</a>

- Click on 'Add/Remove Data'. This step will allow you to specify a number of things:

- regions from which data has been collected
- time period from which data has been collected
- output form of the data

i) For “Geography”, keep what’s already been selected.

ii) For “Area, Production, ...”, deselect all options but “Total farm value, potatoes (dollars)”

iii) For “Select Time Frame”, specify your range as 1950 to 2015 (Interesting Fact: 1950 is also 100 years following the Irish Potato Famine).

iv) Under “Select Screen Format”, make sure that you have “time as rows”.

v) Now “Apply”.

### Step 1- Select: Geography

(1 of 11 items selected)

Use the following checkboxes to select/deselect items from the list below:

- All
- Canada <sup>2, 3</sup>
- Newfoundland and Labrador <sup>2</sup>
  - Prince Edward Island
  - Nova Scotia
  - New Brunswick

### Step 2- Select: Area, production and farm value of potatoes

(7 of 7 items selected)

- Seeded area, potatoes (acres)
- Harvested area, potatoes (acres) <sup>4</sup>
- Average yield, potatoes (hundredweight per harvested acres) <sup>5, 6</sup>
- Production, potatoes (hundredweight)
- Amount sold, consumed, seeded or fed to livestock, potatoes (hundredweight) <sup>7, 8</sup>
- Average farm price, potatoes (dollars per hundredweight) <sup>8, 9, 10</sup>
- Total farm value, potatoes (dollars) <sup>8</sup>

### Step 3 - Select the time frame

By default, only data for the most recent periods available will be retrieved. You may use the lists below to select a different time frame.

From : 1950 ▼ To : 2015 ▼ (Annual data)

### Step 4 - Select the Screen output format

HTML table, time as rows ▼

f) Now it’s time to download the data. Go to the “Download” tab.

Information for... Browse by subject Browse by key resource Help

## Table 001-0014 <sup>1</sup>

### Area, production and farm value of potatoes

annual (data in thousands)

Data table Add/Remove data Manipulate Download Related information Help

The data below is a part of CANSIM table 001-0014. Use the [Add/Remove data](#) tab to customize your table.

#### Selected Items [\[Add/Remove data\]](#)

Geography = Canada <sup>2, 3</sup>

Area, production and farm value of potatoes = Total farm value, potatoes (dollars) <sup>8</sup>

g) Download your data as indicated (see below).

h) At this time, save your data to a space where you can reliably and efficiently access it.

**Option 1 - Download data as displayed in the Data table tab**

Select the language:  
English

Select the data output format type:  
time as rows

Select the file format:  
CSV (comma-separated values) English spreadsheet

Series details:  
normal retrieval  
vector identifier, plus coordinate, plus data

Download data

## Alternative format - CSV document

The following document is available for downloading or viewing:

- [Download file from CANSIM \(CSV Version, 1.463kb\)](#)

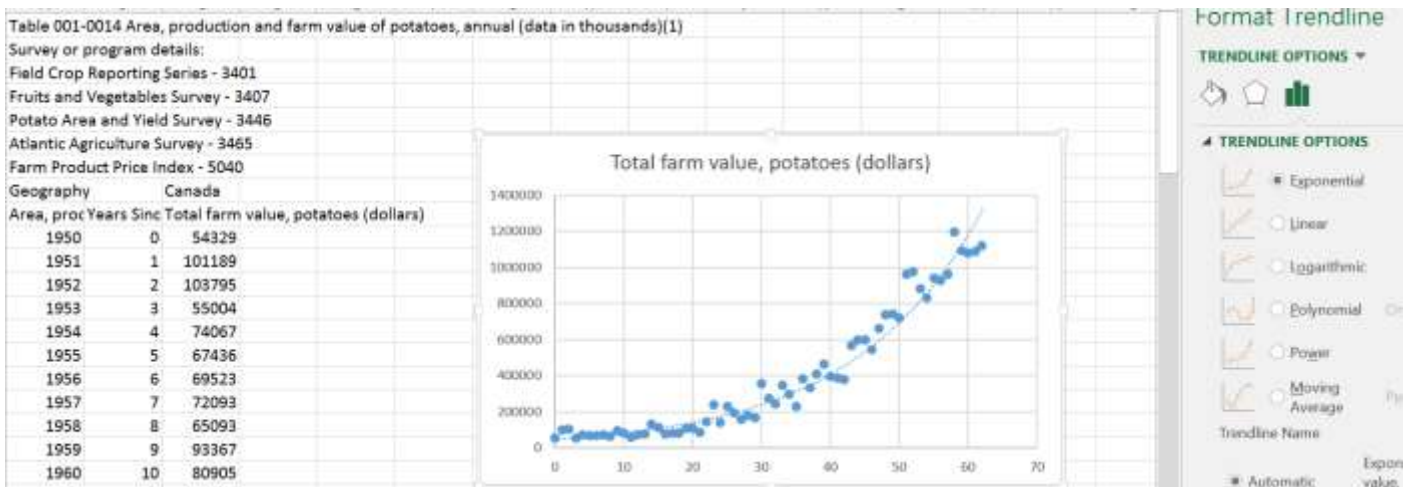
## 2-Generating a Curve of Best Fit in Excel

a)

- Now that you have the data in Excel, you need to start thinking about what is going to be x (the **independent variable**, the 'predictor' variable) and what will be y (the **dependent variable**, the 'response' variable).
- In this case, *time* will be the independent variable; *Total farm value, potatoes*, the dependent variable.
- As for time, you're not going to have the horizontal scale of the graph range using the numbers 1950 to 2015. This will be helpful later on when using an exponential equation for this data set.
  - What you'll need to do is the following:
    - i) Insert a column in between columns A and B, then rename the inserted column as "Years Since 1950" (see below). This means that 1950 will become Year 0 and 2015 will become Year 65 (i.e., 2015 – 1950 = 65).
    - ii) You'll need to fill in the "Years Since 1950" column before moving on to graphing. Speak with your teacher about a 'trick' that will allow you to quickly fill out the "Years Since..." column.

A	B	C	D	E	F	G	H	I
Table 001-0014 Area, production and farm value of potatoes, annual (data in thousands)(1)								
Survey or program details:								
Field Crop Reporting Series - 3401								
Fruits and Vegetables Survey - 3407								
Potato Area and Yield Survey - 3446								
Atlantic Agriculture Survey - 3465								
Farm Product Price Index - 5040								
Geography		Canada						
Area, proc Years Sinc Total farm value, potatoes (dollars)								
1950	0	54329						
1951	1	101189						
1952	2	103795						
1953		55004						
1954		74067						

- b) Now, graph the data. Highlight the indicated section all the way down to '62 Years Since...".
- c) Go to the "Insert" tab and insert a scatter plot.
- d) Your data should be graphed immediately and ready for adding a curve of best fit.
- e) Right-click on the data in the graph and select "Add Trend-line".
- f) To the right, a pop-up box will appear. From there, you can select "Exponential". You should now see an exponential curve appear on the graph of your data.
- g) Save the file for use in the next activity.
- h) Show your completed Excel graph and curve of best fit to your teacher, as there are some special tactics they will show you on how to *extrapolate* your graph in Excel. These tactics will help you to answer the follow-up questions (below).



### 3-Follow-up Questions:

1) Use your graph to determine the total value of farmed potatoes in Canada at the end of the Second World War (i.e., Year? 19\_\_)

Total Value = \$ \_\_\_\_\_ (approx.)

2) Use your graph to determine the total value of farmed potatoes in Canada in 2025 (i.e., Years Since 1950 = \_\_\_\_\_?)

Total Value = \$ \_\_\_\_\_ (approx.)

### 4-Next Few Classes:

**Learning Goal 2 (Day 2):** To understand the properties of exponential relations—namely, the significance of the parameters of the exponential equation,  $y = Ab^x$ —and to apply this equation to solving problems (worked examples).

**Learning Goal 3 (Day 3):** To import data (today's data set) into the statistical software, *Fathom*, and use the software to determine the equation for the curve (exponential) of best fit. Based on the equation, you will validate your estimated answers from Day 1 (see "Follow-up Questions" section).