Power BI Questions (Taxation)

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2021-04-14

POWER BI QUESTIONS (TAXATION)

Question 1

Northern Medical Supplies Inc. (Northern) is a small, family-run business in northern Ontario that has been in business for almost 20 years. Northern sells medical supplies to small and medium-sized medical clinics across the country. It also has a small retail storefront for walk-in customers who require the medical products at home.

Three years ago, Northern started expanding its product offering by carrying some specialized medical equipment, which it sells to small hospitals in Canada. Sales tax has always been an issue for Northern, because it carries so many zero-rated products; the company is now even more concerned because of the increase in specialized equipment.

Because Northern carries a large number of zero-rated products (that is, products to which GST/HST applies at the rate of 0%), total GST charged on sales has historically been in the range of 3% to 4% of total sales. However, over the past five years, GST remitted seems to be increasing — yet there has been no change in the federal rate. Management does not understand why it is having to remit so much more GST and has asked for your advice.

Five years ago, Northern invested in a new sales system that is integrated with its accounting software, and the sales, inventory, cost of goods sold, and sales tax accounts are updated nightly. When preparing its GST return, Northern uses the balances in the general ledger but does not cross reference with individual sales invoices in the sales system.

In addition, because of the special rules around medical devices, the various taxes (if applicable) are assigned at the product level rather than at the sales level. This ensures that zero-rated products are not taxed in error.

Northern's management has asked you to review its GST activity over the past five years to help it understand what has been happening. As a first step, management has asked you to compile some sales and GST information.

You have been provided with a data file (TAX_Power_BI_data) containing the following:

First tab: "Product List"

- *ProductNumber*: a unique identifier assigned to each new product; the first six digits represent the year and month the product was added, and the last two digits represent the order in which the product was added
- *ProductDescription*: a description of the product
- *Price*: the price charged by Northern (cost + 100% markup)

- *TaxRate1*: applicable GST rate
- *2014-2018*: total sales by product for the year indicated
- *2014-(F)Tax to2018-(F)Tax*: GST charged on that product for the year (the sales system can also produce summaries by provincial rate, but that is outside the scope of this project)

Second tab: “Sales”

- *customerID*: a unique identifier assigned to each customer
- *Country:* country of customer
- *InvoiceNumber:* number assigned to each invoice, unique to each sale
- *InvoiceDate:* date of the sale
- *Product:* dollar amount of product sales from the invoice
- *TaxRate1:* dollar amount of GST charged on invoice
- *InvoiceTotal:* total dollar amount of sales price + applicable tax rate(s)

Required:

a) Create a table visualization for sales by year.
b) Create a column chart visualization for sales by year.
c) Create a table visualization for sales by year with a column for GST as a percentage of sales.
d) Create a card visualization with the count of products.

Follow the steps outlined below.

Hints:

- Your visualization has to be selected before you can work on it. To select your visualization, simply click on it in Power BI.
- Using Microsoft’s Snipping Tool, you can easily capture an image of the specific visualization requested.

Question 2

Further to Question 1, management now wants you to use Power BI to further analyze the product and sales information you have imported to identify the GST errors in Northern's sales system.

Required:

i. Create a table visualization of all products and their applicable tax rate.

ii. Create a table visualization that shows all products with a tax rate greater than 5%.

iii. Create a table visualization that shows the total sales and total GST collected on products using incorrect tax rates.

iv. Create a table visualization that shows the amount that should have been collected using the correct 5% rate.

v. Create a table visualization that shows the calculation of the known GST error.

Use the same Power BI file from Question 1.

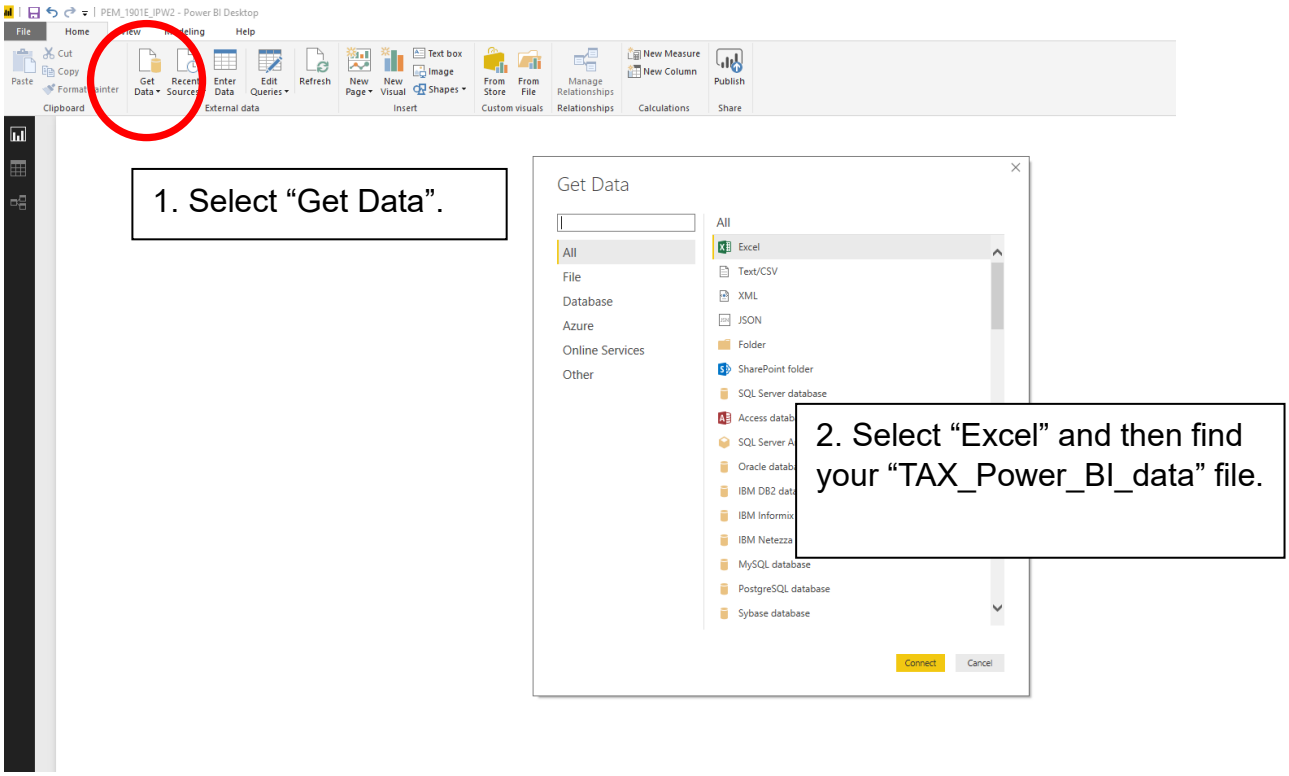
Solutions

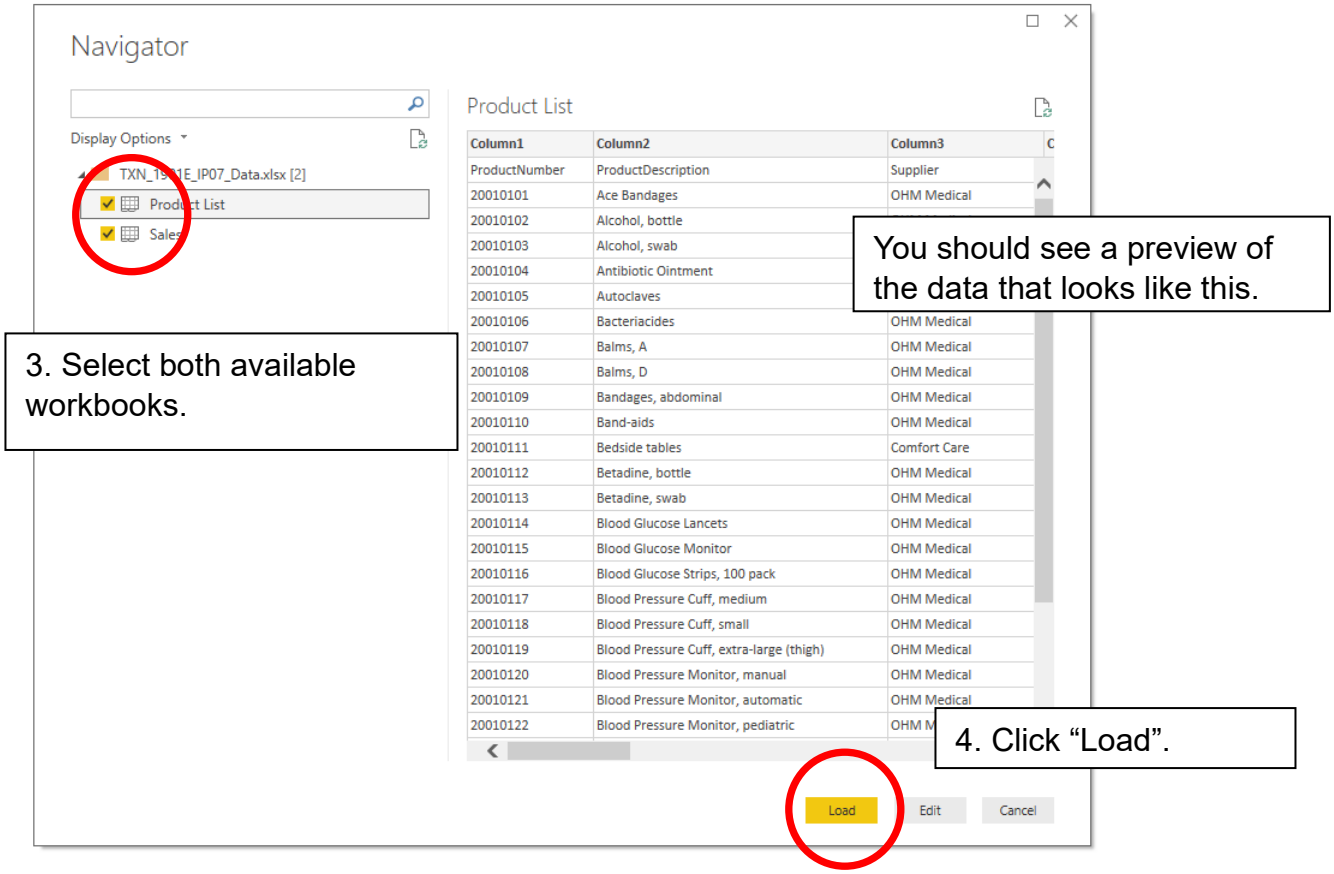
Solution to Question 1

Power BI instructions

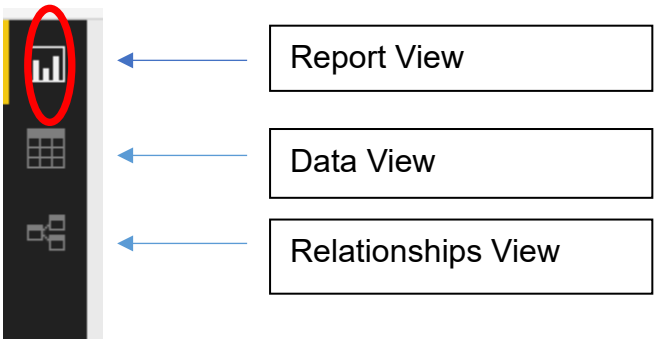
Step 1:

Open Power BI and import the “TAX_Power_BI_data” file using the “Get Data” function. Use the screenshots below to guide you through the steps.

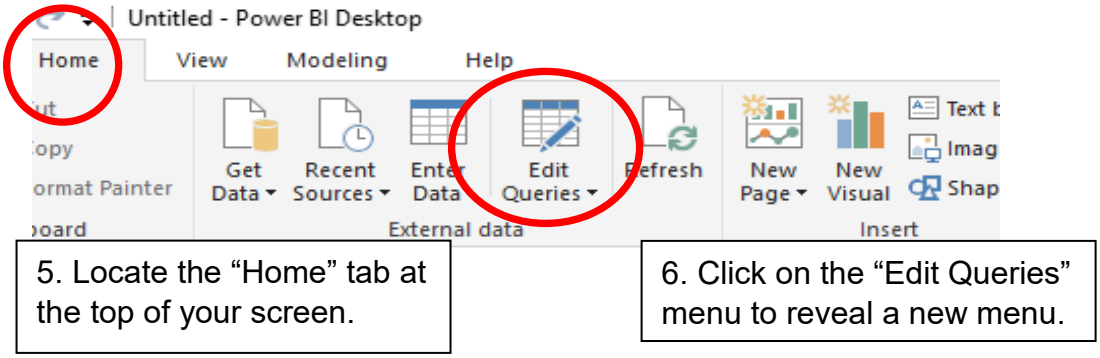




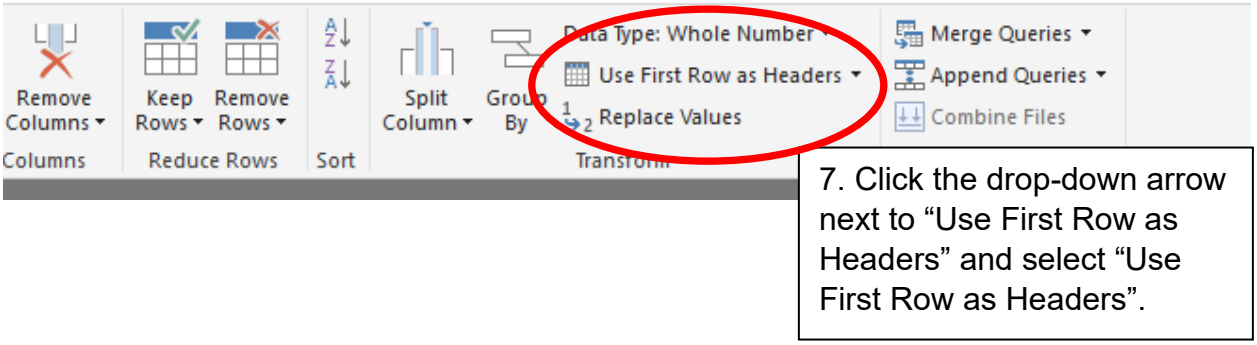
When the file has been successfully imported, Power BI will open to the “Report” screen. You will know that you are in the Visualization Environment by looking to the left-hand side of your screen.



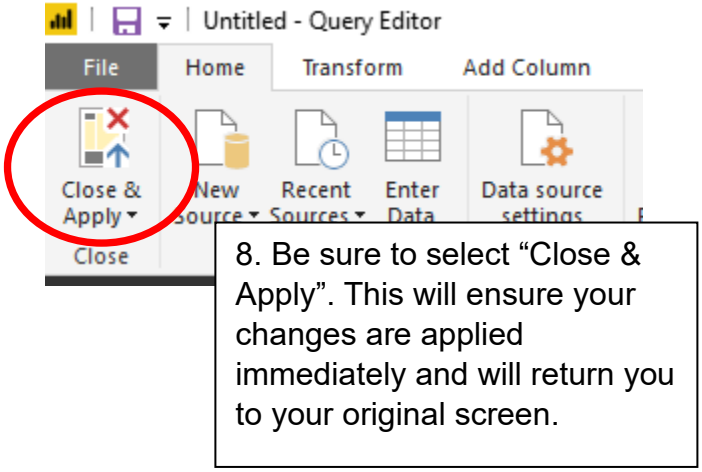
Next, ensure that Power BI recognizes the top row as a header by selecting the “Data View” and selecting each database. If the top row is not recognized as the header, select “Edit Queries” under the “Home” tab:



The “Edit Queries” menu will look like this:



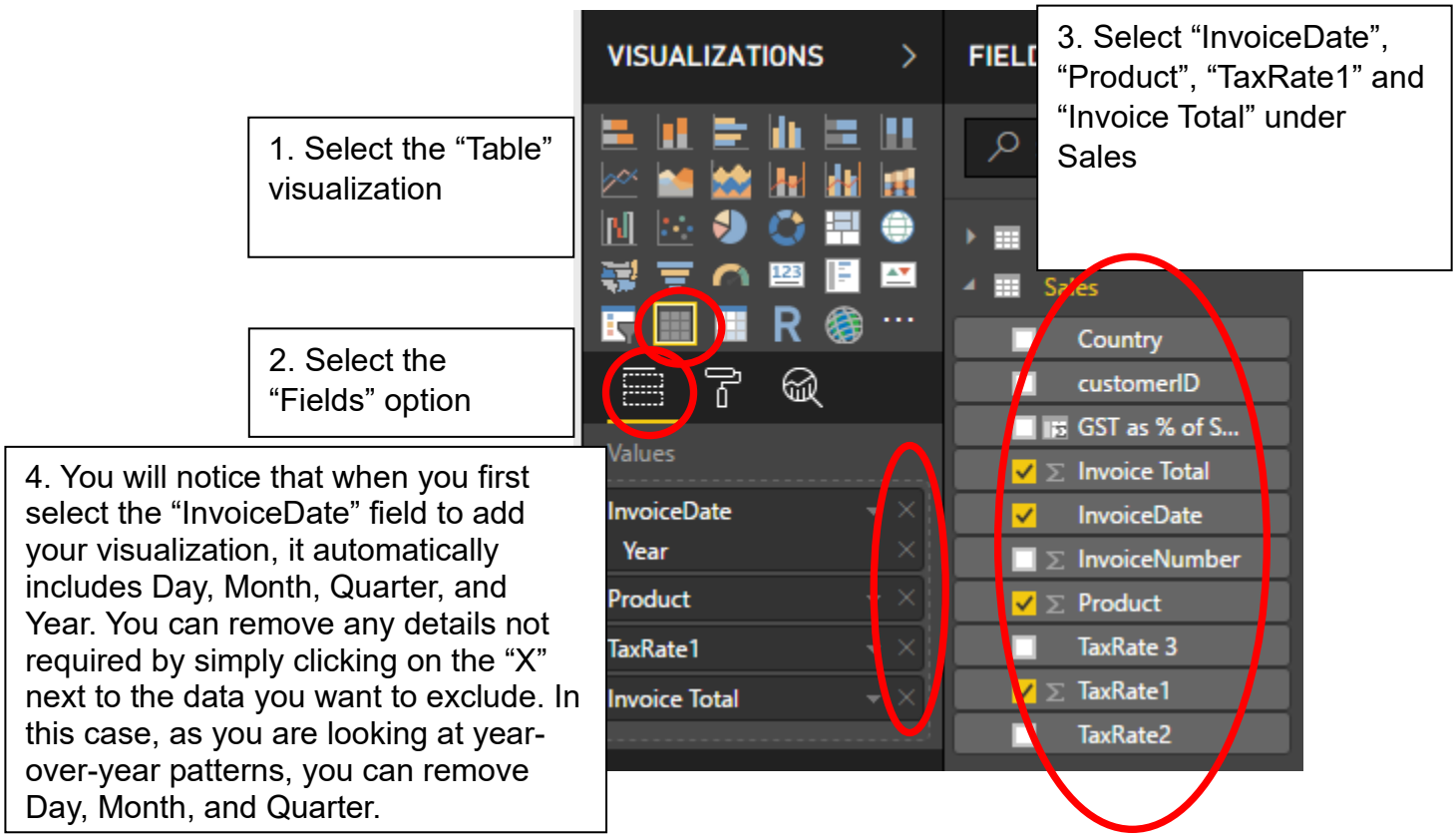
Then click “Close & Apply”. It will return your original screen.



Step 2:

Before jumping straight into your analysis of GST charged and remitted during the five-year period under review, it is a good idea to get a sense of what Northern's sales patterns were for that time period.

You can quickly examine summary information by creating a visualization using the "Table" function. Go back to the Report View and follow the instructions below:



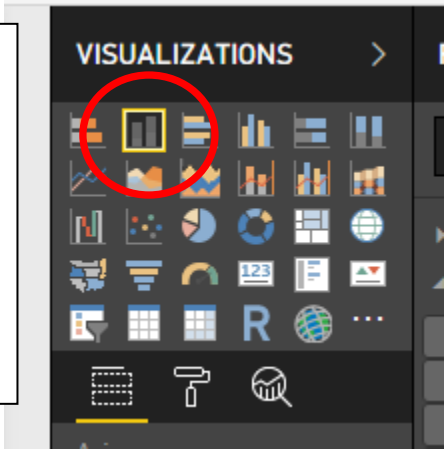
Hint: Be sure to give the page ("tab") that you are working on appropriate name. You can rename pages by right-clicking, just as you would in Excel.

Save: Take a screenshot of your table and save it in Word in response to part a).

Step 3:

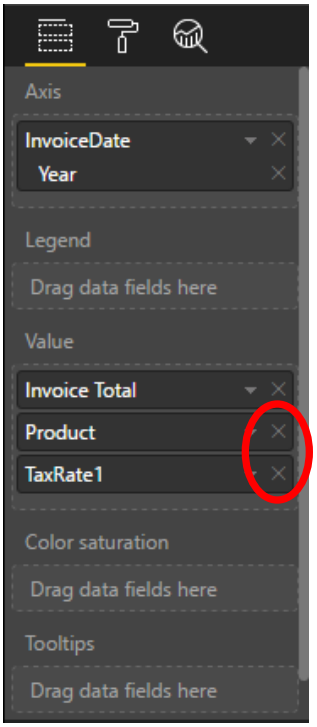
Although a table can quickly and easily tell you what sales were in each year, you are still left trying to visualize and/or calculate the year-over-year changes. There are better ways to represent this data.

1. Duplicate your tab by right-clicking on the existing tab and selecting “Duplicate Page”. Select your table (by clicking on it) and then select the clustered column chart icon from the visualizations.



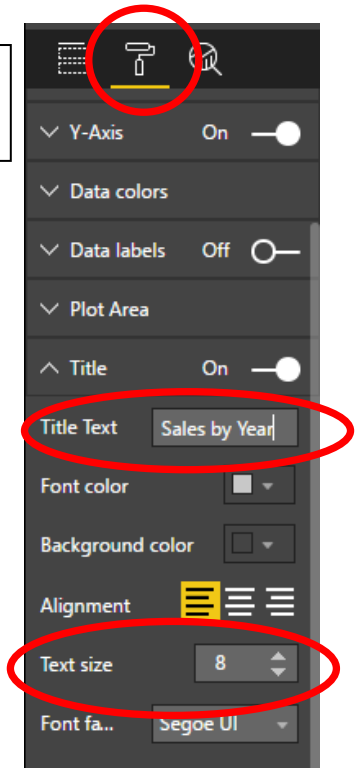
You only need the invoice total, so you can remove the Product and TaxRate1 fields from the column chart.

2. “X” out the “Product” and “TaxRate1” fields



Last, add a title to your chart:

3. Select the paint roller.



4. Toggle the “Title” option to On, and type “Sales by Year” into the “Title Text” to add a title to the card.

5. Change Text size to 20 or higher and centre your title.

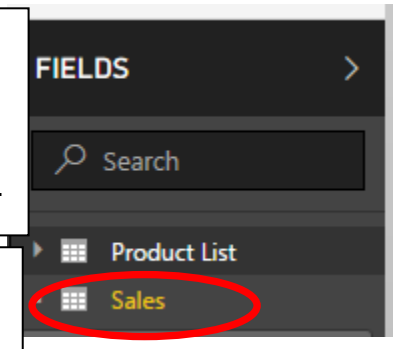
Save: Take a screenshot of your chart with a title in response to part b).

Step 4:

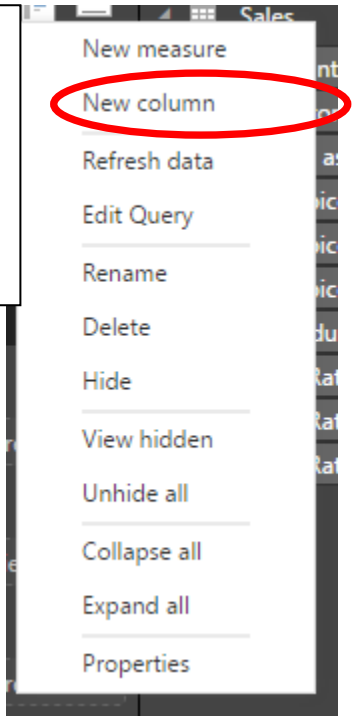
Northern’s management is concerned that it has been collecting and remitting more GST than it should be. You can determine if management’s hunch is correct by analyzing the data. You will need to add a new column to the dataset. This is similar to adding a column in Excel in order to perform additional analysis. In this case, you want to present GST as a percentage of product sales for each of the five years.

1. Duplicate your first page of analysis one more time. Make sure your visualization is active by clicking on it.

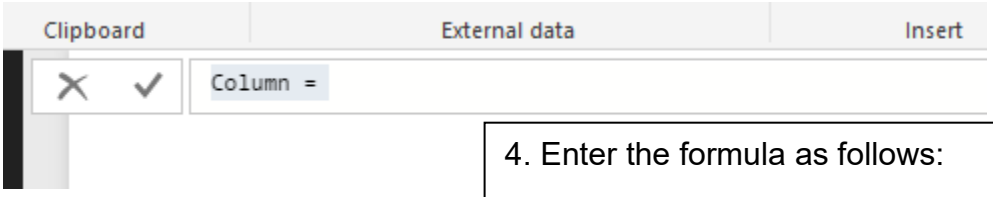
2. Select the “Sales” from in the “FIELDS” category.



3. Right-click on “Sales” to reveal an edit menu. Select “New column” (This can also be done by selecting “New Column” from the Home Tab)



You can use this new column to perform computations on existing columns in the table. As you want to present GST as a percentage of product sales for each of the five years, you will need to enter the formula (or DAX code) that you want to use in the formula bar at the top of the page:

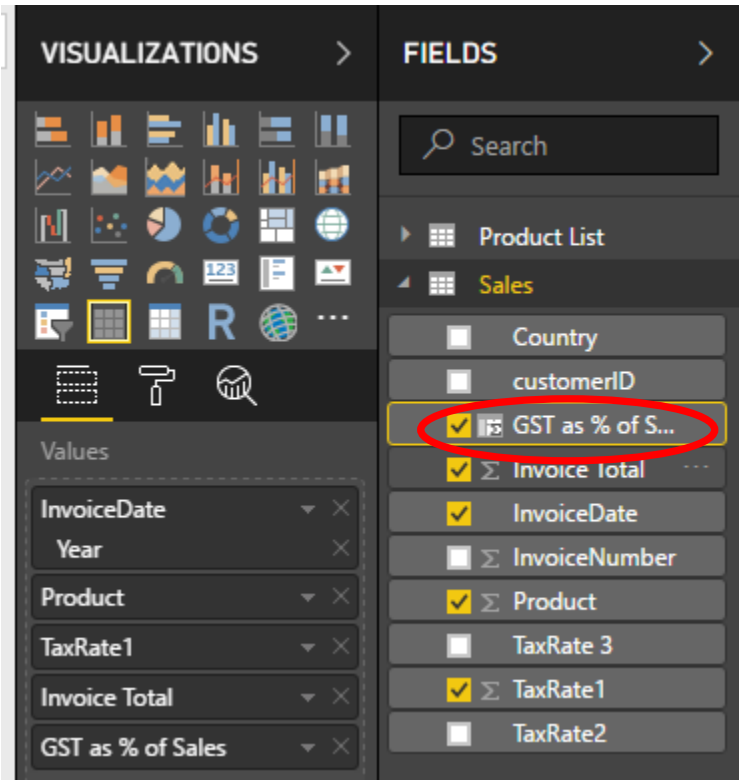


4. Enter the formula as follows:

“GST as % of Sales = Sales[TaxRate1]/Sales[Product] and press Enter. This will also rename your “Column1” to “GST as % of Sales” and you will now see this field under your “Sales” data sheet.

Note: In the formula above, “Sales” is the table you are referencing, and the fields in square brackets (“TaxRate1” and “Product” above) are the existing fields you want to include. Once you begin typing, Power BI will offer auto-complete options to help simplify the process.

To add this new column ("GST as % of Sales") to your visualization, you need to add the field to the "Values" area.



5. Add the new column to the "Values" area by adding a checkmark to the field.

Hint: The order in which items appear in your table is dictated by the order in which they are listed in in the "Values" area. By clicking and dragging, you can change the order of the fields.

Save: Take a screenshot of your table in your response to part c).

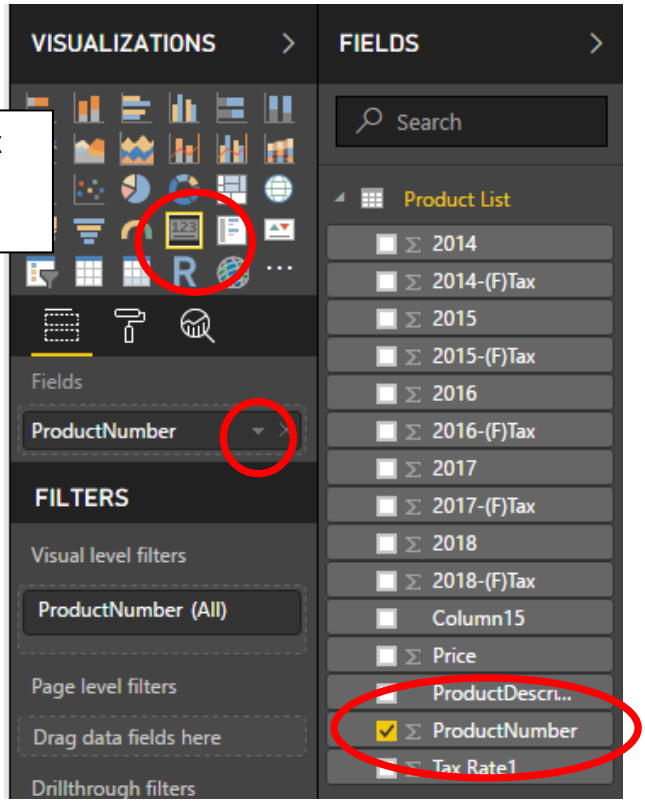
Step 5:

GST as a percentage of sales has grown at a faster rate than sales. Management would now like you to review its product listing and the tax rates assigned.

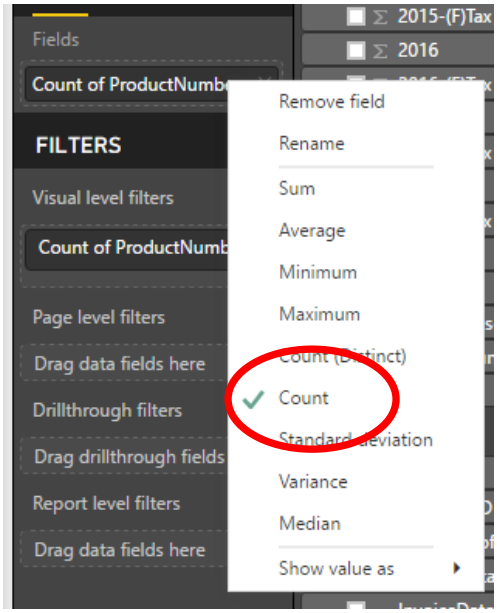
To understand the magnitude of the product offered by Northern, you can use a "Card" visualization to quickly present the number of products offered. As each product has a unique product number, this field is the best one to use for this task.

Select a new tab and follow the instructions below:

1. Locate and select the “Card” icon from the visualization



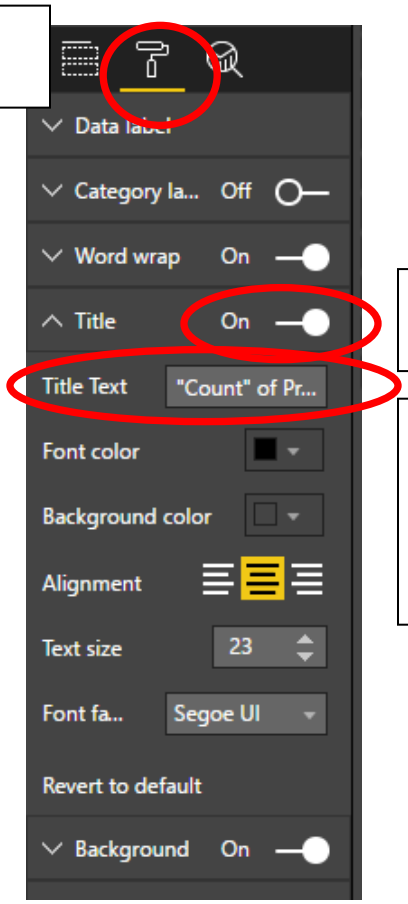
2. Add the “ProductNumber” field from the “Product List” table to the “Values” area.



3. Click the drop-down arrow next to “ProductNumber” in the “Fields” area, and then select “Count”.

Titles are important when presenting information visually. Be sure to give your visualization a title that is easily understood.

4. Select the formatting menu.



5. Toggle the “Title” option to On.

6. Give your visualization an appropriate title (“Count” of Products”).

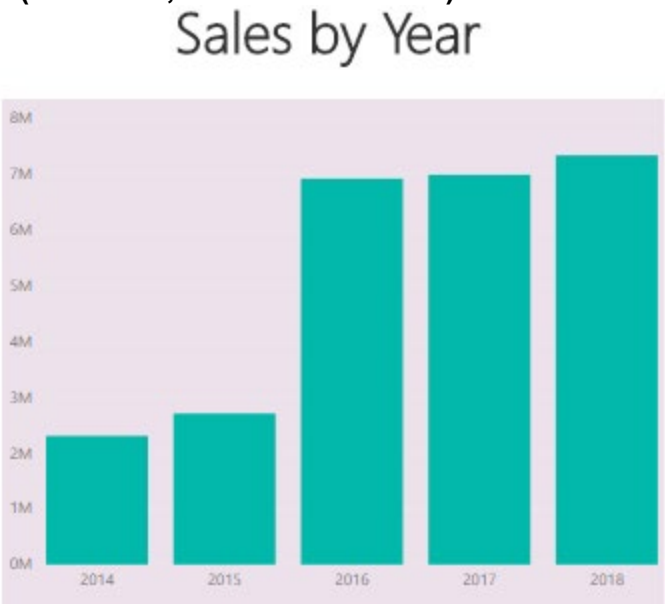
Save: Take a screenshot of your card in response to part d).

Screenshots:

Part a) Annual sales (table format):

Year	Product	TaxRate1	Invoice Total
2018	7,345,638.09	533,592.11	7,879,230.20
2017	6,995,845.80	508,182.96	7,504,028.76
2016	6,926,580.00	503,151.45	7,429,731.45
2015	2,711,190.00	142,360.73	2,853,550.73
2014	2,309,000.00	90,307.50	2,399,307.50
Total	**26,288,253.89**	**1,777,594.75**	**28,065,848.64**

Part b) Annual sales (bar chart, with text box title):



Part c) Annual sales (table format with new column):

Year	Product	TaxRate1	Invoice Total	GST as % of Sales
2014	2,309,000.00	90,307.50	2,399,307.50	4.55
2015	2,711,190.00	142,360.73	2,853,550.73	5.80
2016	6,926,580.00	503,151.45	7,429,731.45	6.70
2017	6,995,845.80	508,182.96	7,504,028.76	6.70
2018	7,345,638.09	533,592.11	7,879,230.20	6.70
Total	**26,288,253.89**	**1,777,594.75**	**28,065,848.64**	**30.45**

Part d) Total products (using “count” functionality) with custom title:

"Count" of Products

128

Solution to Question 2

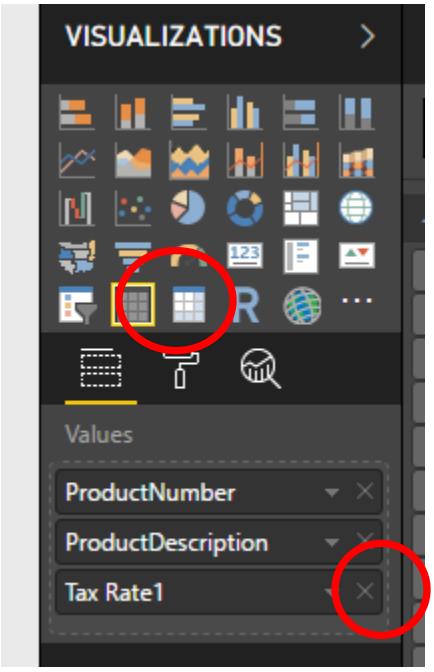
Step 1:

Based on the information provided by management, each product carried by Northern should have a TaxRate1 of either 0 (for zero-rated products) or 5 (for everything else). However, given that GST has climbed above 5% of sales, as shown in Question 1, it appears that there may be an error with one or more products.

To review Northern's product listing and the amount coded to TaxRate1, you can again use a table.

Start a new tab and select the table visualization:

1. You will want to include the "ProductNumber" field (since this will give us some idea when the item was added to Northern's listing), the "ProductDescription" field (since this can be compared to the CRA listing), and, of course, the amount of the "TaxRate1" field. All of these fields come from the "Product List" data.



2. Ensure that the TaxRate1 is not summarized, by selecting the drop-down menu and clicking "Don't summarize".

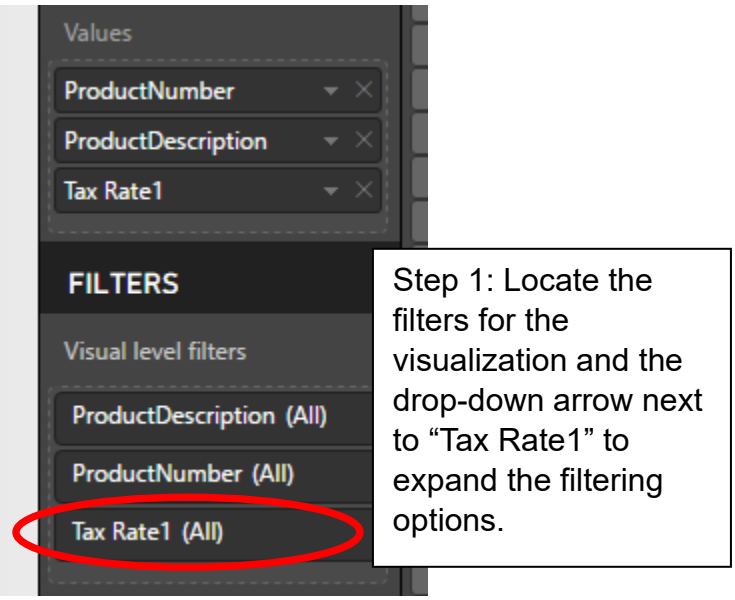
Save: Take a screenshot of your table and include it in your response to Part (i). Please note that the full table cannot be captured on a single page. Power BI will automatically organize the data so that the ProductDescription is in alphabetical order. Only capture a page of data and start your capture from the top of your list.

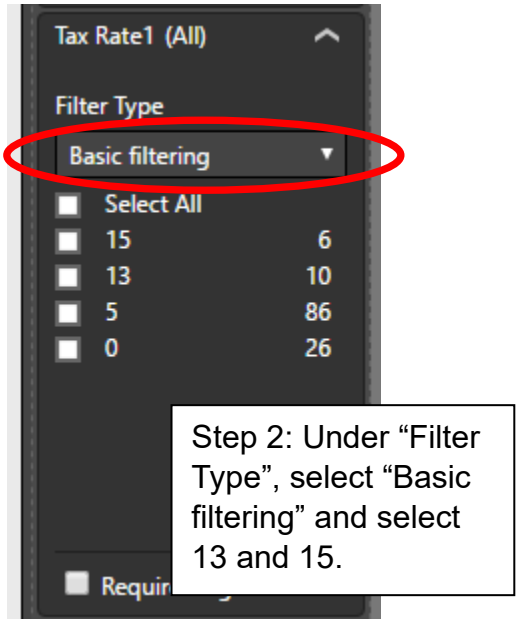
Step 2:

Duplicate your page from the previous step.

This time, you will want to filter out all of the products with “0” or “5” assigned. For now, assume these are the correct codes for the products.

Using the built-in filters, select “Basic filtering” from the drop-down menu (“Advanced filtering” is the default), and select all the listed numbers that are not 0 or 5:





This will generate a much shorter list of products with known errors.

Save: Take a screenshot of your table and include it as your response to Part (ii).

Step 3:

Northern’s management will want to quantify the magnitude of the error. However, its sales system only tracks sales and applicable taxes on an annual (not cumulative) basis. Therefore, the first thing you will have to do is add two new columns to the “Product List” table.

The first column will be used to produce “Total Sales” over the five-year period by product, and the second will be used to produce “Total-(F)Tax”.

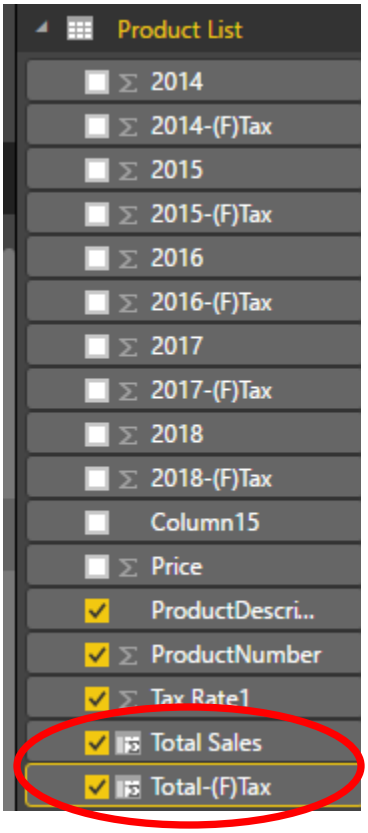
Follow the steps outlined in **Question 1**, **Step 4**, to create your new columns, but use the following formulas:

Total Sales = 'Product List'[2014]+'Product List'[2015]+'Product List'[2016]+'Product List'[2017]+'Product List'[2018]

And

Total-(F)Tax = 'Product List'[2014-(F)Tax]+'Product List'[2015-(F)Tax]+'Product List'[2016-(F)Tax]+'Product List'[2017-(F)Tax]+'Product List'[2018-(F)Tax]

As before, these new columns [Total Sales and Total-(F)Tax] will now be listed under the Product List data and can be added to your visualization by clicking them.



Save: Take a screenshot of your table and include it as your response to Part (iii).

Step 4:

Total sales and total tax are not enough to quantify the potential error. These represent actual amounts collected and remitted to the government. However, assuming all of these products should have the 5% tax rate applied to them, we can develop an expectation of what the GST should have been if the tax had been entered correctly in the beginning.

This will require an additional new column, as outlined above. Use the formula:

Expected GST = 'Product List'[Total Sales]*0.05

Add this column to your visualization by clicking on the newly created “Expected GST” field.

Save: Take a screenshot of your table and include it as your response to Part (iv).

Step 5:

There is a significant difference between the actual GST collected and remitted, and what would be expected. Since Northern’s management will be focused on this difference, it is a good idea to calculate it and add it to your visualization.

Save: Take a screenshot of your table and include it as your response to Part (v).

Screenshots:

Part (i) List of all products with applicable tax rate:

ProductNumber	ProductDescription	Tax Rate1
20010101	Ace Bandages	5
20010102	Alcohol, bottle	5
20010103	Alcohol, swab	5
20010104	Antibiotic Ointment	5
20010105	Autoclaves	5
20010106	Bacteriacides	5
20010107	Balms, A	5
20010108	Balms, D	5
20010109	Bandages, abdominal	5
20010110	Band-aids	5
20010111	Bedside tables	5
20010112	Betadine, bottle	5
20010113	Betadine, swab	5
20010114	Blood Glucose Lancets	5
20010115	Blood Glucose Monitor	0
20010116	Blood Glucose Strips, 100 pack	5
20010117	Blood Pressure Cuff, medium	5
20010118	Blood Pressure Cuff, small	5
20010119	Blood Pressure Cuff, extra-large (thigh)	5
20010120	Blood Pressure Monitor, manual	5
20010121	Blood Pressure Monitor, automatic	5

Note: This table will not fit in a single screenshot (as indicated by the scrolling bar on the right-hand side of the visualization).

Part (ii) List of all products with a tax rate greater than 5%:

ProductNumber	ProductDescription	Tax Rate1
20010173	Laryngoscopes and stylets	13
20010187	Patient room chairs	13
20150801	All-position chair	13
20150802	Beds, electric	13
20150803	Beds, manual	13
20150804	Cardiac monitors	13
20150805	Defibrillators	13
20150806	Exam tables	13
20150808	Infant incubators	13
20150810	Wheelchairs	13
20160101	Anesthesia machines	15
20160102	EKG machines	15
20160103	OR tables	15
20160104	Portable ultrasound machines	15
20160105	Portable x-ray machines	15
20160106	Ventilators, In-patient	15

Note: The solution table is organized by product number. Therefore, students' tables may not look the same.

Part (iii) Total sales and total GST collected on products using incorrect tax rates:

ProductNumber	ProductDescription	Tax Rate1	Total Sales	Total-(F)Tax
20010173	Laryngoscopes and stylets	13	401,051.04	60,157.66
20010187	Patient room chairs	13	386,429.39	57,964.41
20150801	All-position chair	13	154,245.60	23,136.84
20150802	Beds, electric	13	128,538.00	19,280.70
20150803	Beds, manual	13	114,256.00	17,138.40
20150804	Cardiac monitors	13	571,280.00	85,692.00
20150805	Defibrillators	13	114,256.00	17,138.40
20150806	Exam tables	13	374,902.50	56,235.38
20150808	Infant incubators	13	642,690.00	96,403.50
20150810	Wheelchairs	13	234,796.08	35,219.41
20160101	Anesthesia machines	15	1,842,300.00	276,345.00
20160102	EKG machines	15	383,812.50	57,571.88
20160103	OR tables	15	371,530.50	55,729.58
20160104	Portable ultrasound machines	15	997,912.50	149,686.88
20160105	Portable x-ray machines	15	767,625.00	115,143.75
20160106	Ventilators, In-patient	15	108,081.60	16,212.24
Total			**7,593,706.71**	**1,139,056.01**

Part (iv) Amount that should have been collected using the correct 5% rate:

ProductNumber	ProductDescription	Tax Rate1	Total Sales	Total-(F)Tax	Expected GST
20010173	Laryngoscopes and stylets	13	401,051.04	60,157.66	20,052.55
20010187	Patient room chairs	13	386,429.39	57,964.41	19,321.47
20150801	All-position chair	13	154,245.60	23,136.84	7,712.28
20150802	Beds, electric	13	128,538.00	19,280.70	6,426.90
20150803	Beds, manual	13	114,256.00	17,138.40	5,712.80
20150804	Cardiac monitors	13	571,280.00	85,692.00	28,564.00
20150805	Defibrillators	13	114,256.00	17,138.40	5,712.80
20150806	Exam tables	13	374,902.50	56,235.38	18,745.13
20150808	Infant incubators	13	642,690.00	96,403.50	32,134.50
20150810	Wheelchairs	13	234,796.08	35,219.41	11,739.80
20160101	Anesthesia machines	15	1,842,300.00	276,345.00	92,115.00
20160102	EKG machines	15	383,812.50	57,571.88	19,190.63
20160103	OR tables	15	371,530.50	55,729.58	18,576.53
20160104	Portable ultrasound machines	15	997,912.50	149,686.88	49,895.63
20160105	Portable x-ray machines	15	767,625.00	115,143.75	38,381.25
20160106	Ventilators, In-patient	15	108,081.60	16,212.24	5,404.08
Total			**7,593,706.71**	**1,139,056.01**	**379,685.34**

Part (v) Calculation of known GST error:

```
GST Error = 'Product List'[Total-(F)Tax]-'Product List'[Expected GST]
```

ProductNumber	ProductDescription	Tax Rate1	Total Sales	Total-(F)Tax	Expected GST	GST Error
20010173	Laryngoscopes and stylets	13	401,051.04	60,157.66	20,052.55	40,105.10
20010187	Patient room chairs	13	386,429.39	57,964.41	19,321.47	38,642.94
20150801	All-position chair	13	154,245.60	23,136.84	7,712.28	15,424.56
20150802	Beds, electric	13	128,538.00	19,280.70	6,426.90	12,853.80
20150803	Beds, manual	13	114,256.00	17,138.40	5,712.80	11,425.60
20150804	Cardiac monitors	13	571,280.00	85,692.00	28,564.00	57,128.00
20150805	Defibrillators	13	114,256.00	17,138.40	5,712.80	11,425.60
20150806	Exam tables	13	374,902.50	56,235.38	18,745.13	37,490.25
20150808	Infant incubators	13	642,690.00	96,403.50	32,134.50	64,269.00
20150810	Wheelchairs	13	234,796.08	35,219.41	11,739.80	23,479.61
20160101	Anesthesia machines	15	1,842,300.00	276,345.00	92,115.00	184,230.00
20160102	EKG machines	15	383,812.50	57,571.88	19,190.63	38,381.25
20160103	OR tables	15	371,530.50	55,729.58	18,576.53	37,153.05
20160104	Portable ultrasound machines	15	997,912.50	149,686.88	49,895.63	99,791.25
20160105	Portable x-ray machines	15	767,625.00	115,143.75	38,381.25	76,762.50
20160106	Ventilators, In-patient	15	108,081.60	16,212.24	5,404.08	10,808.16
Total			**7,593,706.71**	**1,139,056.01**	**379,685.34**	**759,370.67**

It appears that most of Northern's collection and remittance errors occurred from 2015 to 2018, inclusive, based on the product numbers with the erroneous tax rates. The Canada Revenue Agency (CRA) allows for adjustments to tax collected and input tax credits (ITCs) claimed.