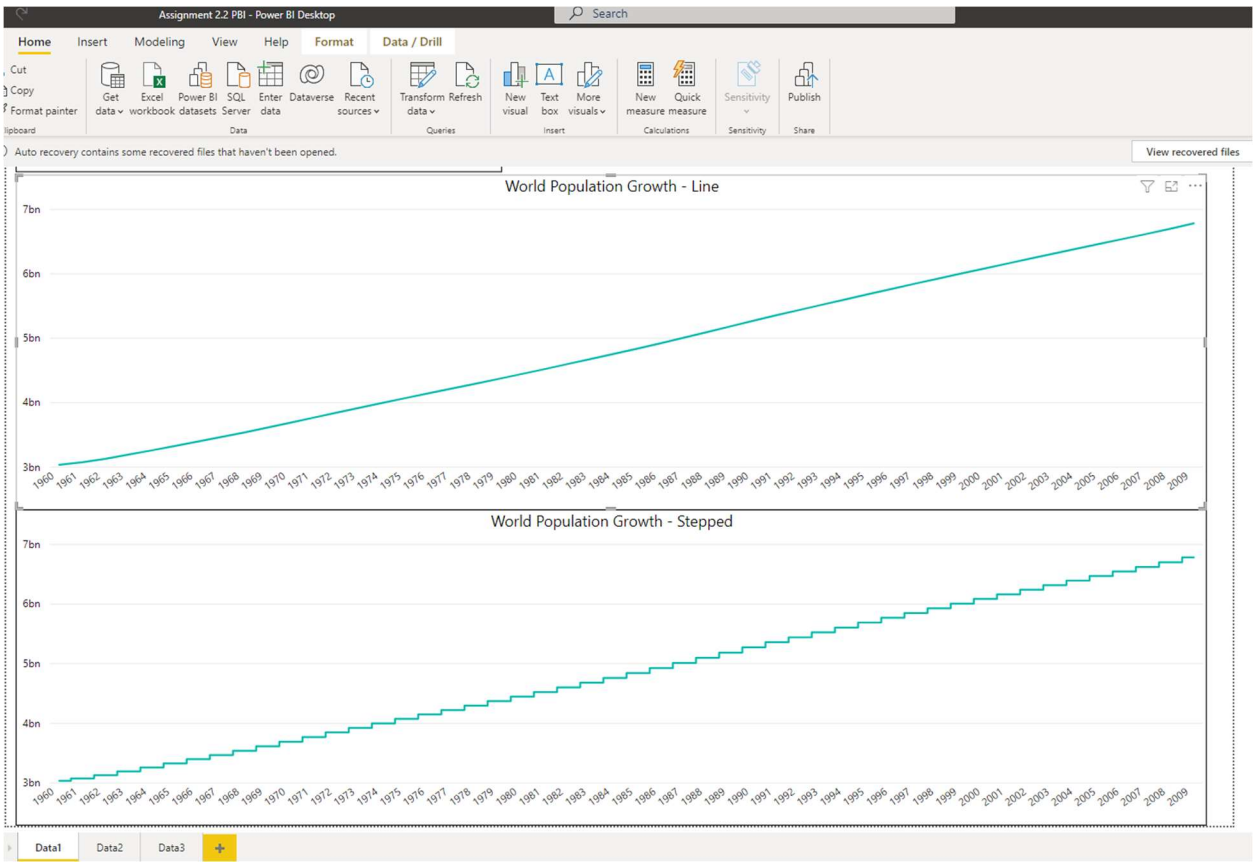
Sri R Sankaranarayanan

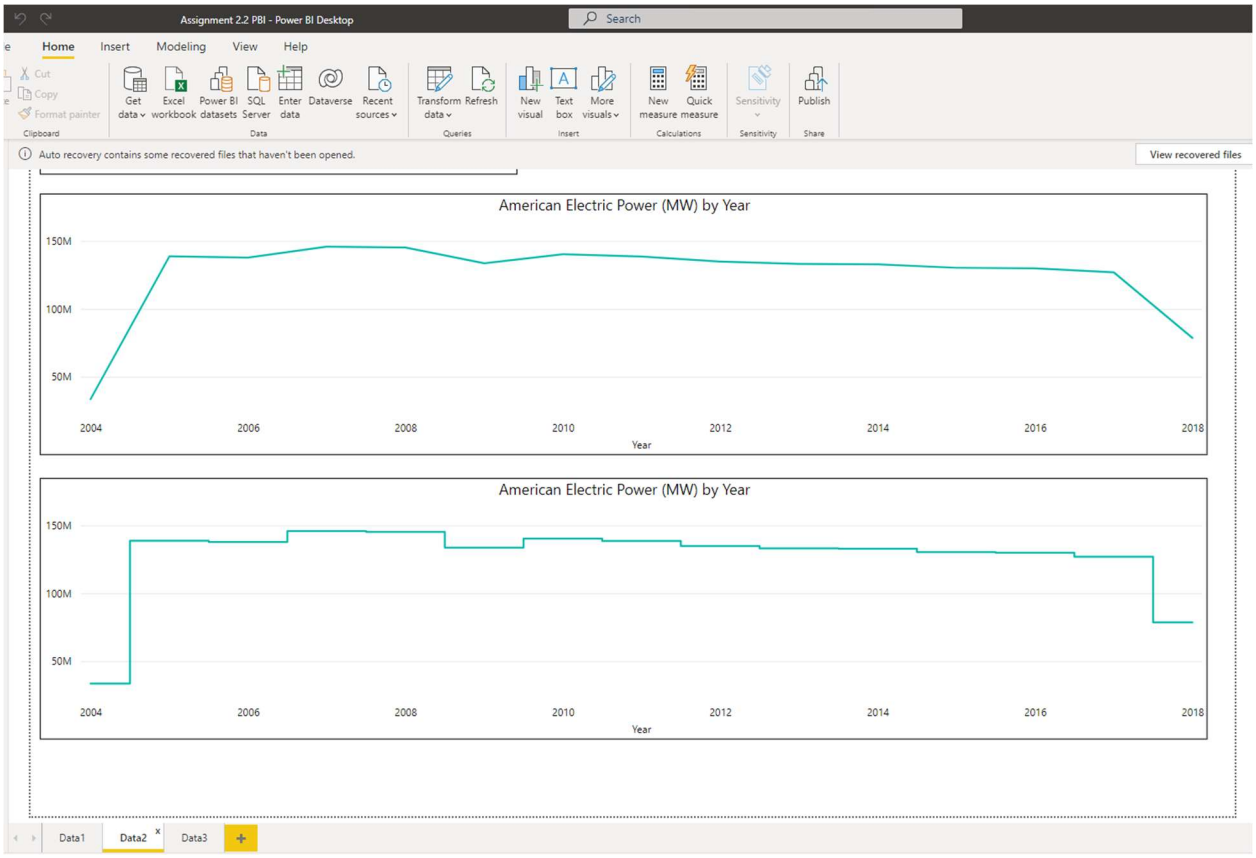
DSC640 – Data Visualization

1. PowerBI - Line and Step Chart

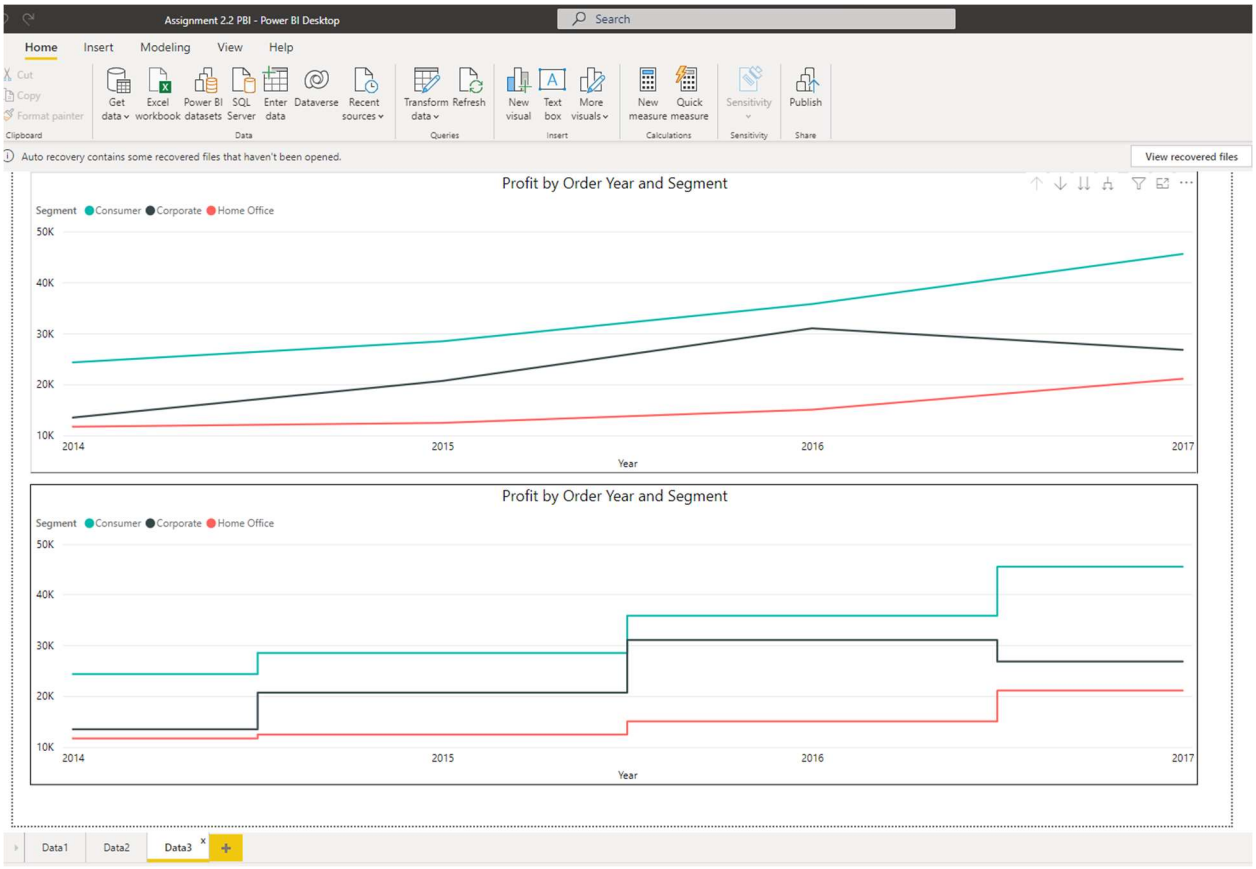
Data 1



Data 2


Assignment 2.2 PBI - Power BI Desktop
Search
Home
Insert
Modeling
View
Help
Auto recovery contains some recovered files that haven't been opened.
View recovered files
American Electric Power (MW) by Year
150M
100M
50M
2004
2006
2008
2010
2012
2014
2016
2018
Year
American Electric Power (MW) by Year
150M
100M
50M
2004
2006
2008
2010
2012
2014
2016
2018
Year
Data1
Data2
Data3

Data 3


Assignment 2.2 PBI - Power BI Desktop
Search
Home
Insert
Modeling
View
Help
Auto recovery contains some recovered files that haven't been opened.
View recovered files
Profit by Order Year and Segment
Segment Consumer Corporate Home Office
50K
40K
30K
20K
10K
2014
2015
2016
2017
Year
Profit by Order Year and Segment
Segment Consumer Corporate Home Office
50K
40K
30K
20K
10K
2014
2015
2016
2017
Year
Data1
Data2
Data3

2. Python – Line and Step Chart

You need to submit 3 line charts and 3 step charts using Tableau or PowerBI, Python and R using the data below (or your own datasets). You can also submit using D3, though not required. You can choose which library to use in Python or R, documentation is provided to help you decide and as you start to play around in the libraries, you will decide which you prefer.

In [1]:

```
# Import libraries
import csv
#import xlrd
import pandas as pd
import matplotlib.pyplot as plt
from datetime import datetime as dt
```

In [3]:

```
# Read world population data
fileData1 = 'world-population.xlsm'
population = pd.read_excel(fileData1, sheet_no = 1)

# Read AEP data
fileData2 = 'AEP_hourly.csv'
aep = pd.read_csv(fileData2)

# Read sample superstore data
fileData3 = 'Sample - Superstore.xlsx'
superstore = pd.read_excel(fileData3)

print(population.head())
print(aep.head())
print(superstore.head())
```

```
   Year  Population
0  1960  3028654024
1  1961  3068356747
2  1962  3121963107
3  1963  3187471383
4  1964  3253112403
             Datetime   AEP_MW
0  2004-12-31 01:00:00  13478.0
1  2004-12-31 02:00:00  12865.0
2  2004-12-31 03:00:00  12577.0
3  2004-12-31 04:00:00  12517.0
4  2004-12-31 05:00:00  12670.0
   Row ID        Order ID Order Date  Ship Date       Ship Mode Customer ID
\
0       1  CA-2016-152156 2016-11-08 2016-11-11    Second Class    CG-12520
1       2  CA-2016-152156 2016-11-08 2016-11-11    Second Class    CG-12520
2       3  CA-2016-138688 2016-06-12 2016-06-16    Second Class    DV-13045
3       4  US-2015-108966 2015-10-11 2015-10-18  Standard Class    SO-20335
4       5  US-2015-108966 2015-10-11 2015-10-18  Standard Class    SO-20335

     Customer Name    Segment        Country             City    ...     \
```

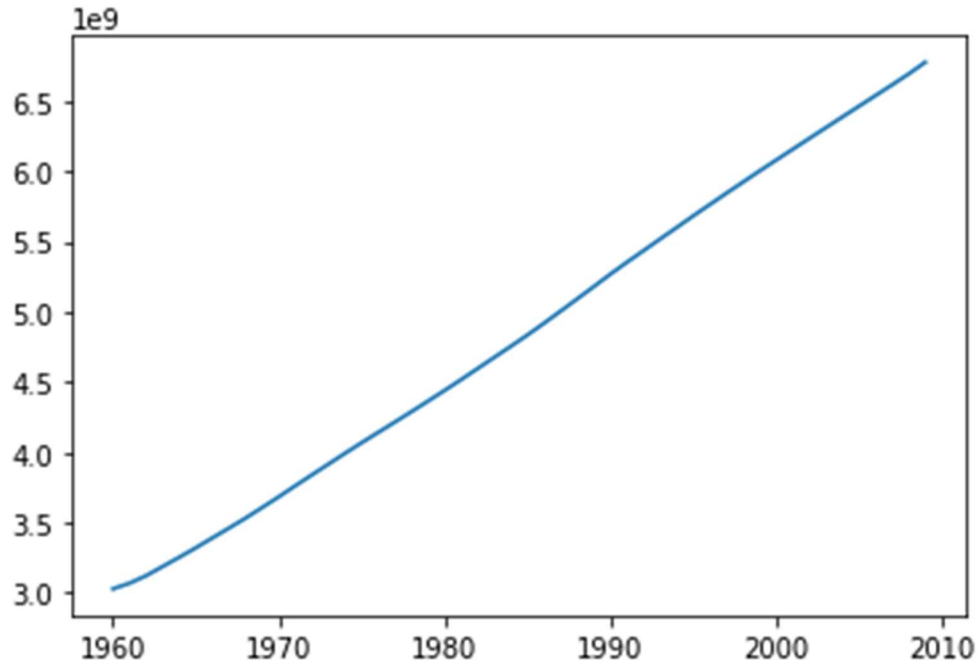
```
0      Claire Gute   Consumer  United States        Henderson    ...
1      Claire Gute   Consumer  United States        Henderson    ...
2  Darrin Van Huff  Corporate  United States      Los Angeles    ...
3   Sean O'Donnell   Consumer  United States  Fort Lauderdale    ...
4   Sean O'Donnell   Consumer  United States  Fort Lauderdale    ...

  Postal Code  Region       Product ID         Category Sub-Category  \
0       42420   South  FUR-BO-10001798        Furniture    Bookcases
1       42420   South  FUR-CH-10000454        Furniture       Chairs
2       90036    West  OFF-LA-10000240  Office Supplies       Labels
3       33311   South  FUR-TA-10000577        Furniture       Tables
4       33311   South  OFF-ST-10000760  Office Supplies      Storage

                                      Product Name     Sales  Quantity  \
0                  Bush Somerset Collection Bookcase  261.9600         2
1  Hon Deluxe Fabric Upholstered Stacking Chairs,...  731.9400         3
2  Self-Adhesive Address Labels for Typewriters b...   14.6200         2
3      Bretford CR4500 Series Slim Rectangular Table  957.5775         5
4                    Eldon Fold 'N Roll Cart System   22.3680         2

   Discount    Profit
0      0.00   41.9136
1      0.00  219.5820
2      0.00    6.8714
3      0.45 -383.0310
4      0.20    2.5164

[5 rows x 21 columns]
```

World Population data

Line and Step graph

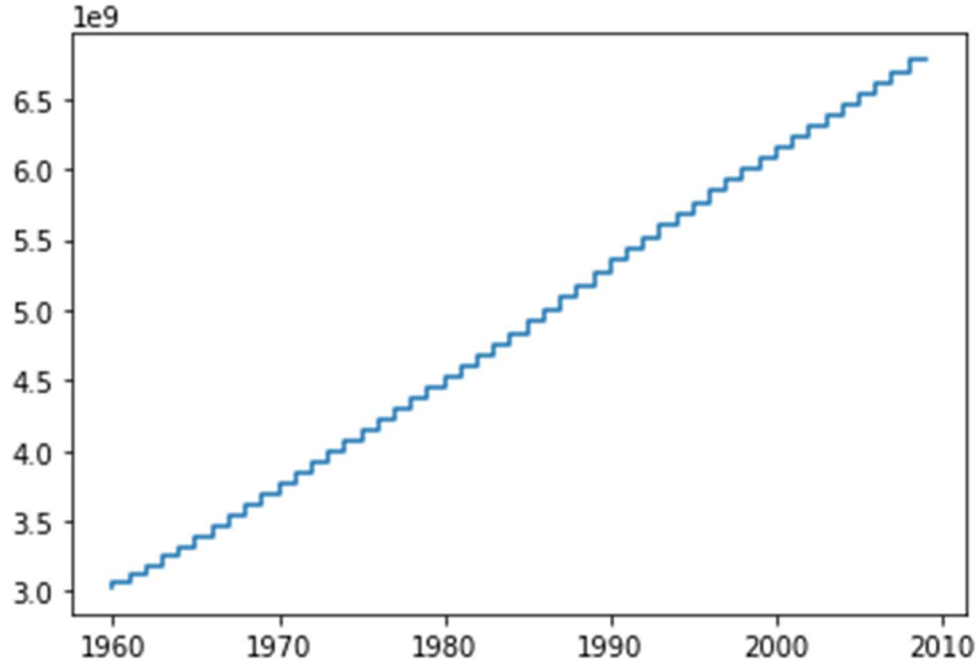
In [69]:

```
X = population['Year']
Y = population['Population']
plt.plot(X, Y)
plt.show()
```



In [70]:

```
plt.step(X, Y)
plt.show()
```



AEP Data

Line and Step graph

For the AEP data, there are too many observations to put in a line plot. Hence I calculated the total of AEP_MW for each year and plotted them

In [59]:

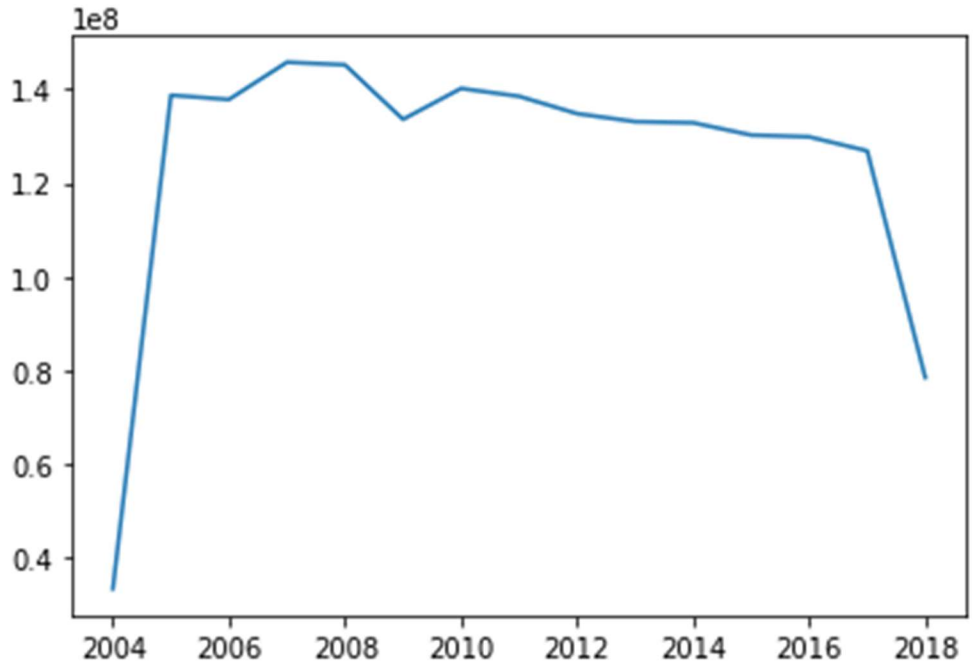
```
# Convert pandas column to datetime
aep['Datetime'] = pd.to_datetime(aep['Datetime'])

# Extract Year and store in a new column
aep['Year'] = aep['Datetime'].dt.year

# Calculate sum of MW for each year
aep_aggr =
aep.groupby(['Year'])['AEP_MW'].agg('sum').reset_index(name='Total_MW')
aep_aggr.head()
```

Out[59]:

	Year	Total_MW
0	2004	33479854.0
1	2005	138752914.0
2	2006	137826610.0
3	2007	145781458.0
4	2008	145224910.0

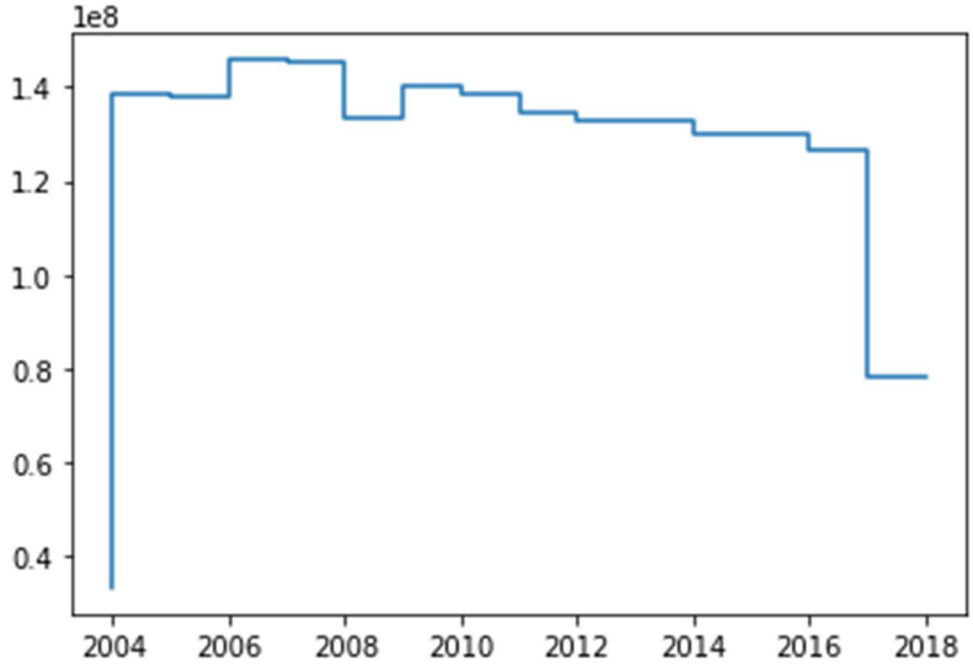
In [72]:

```
X = aep_aggr['Year']
Y = aep_aggr['Total_MW']
plt.plot(X, Y)
plt.show()
```



In [73]:

```
plt.step(X, Y)
plt.show()
```



Sample Superstore data

Line and Step graph

For this data set, I plan to plot the profit by order year and segment. This needs some additional data preparation as below.

In [5]:

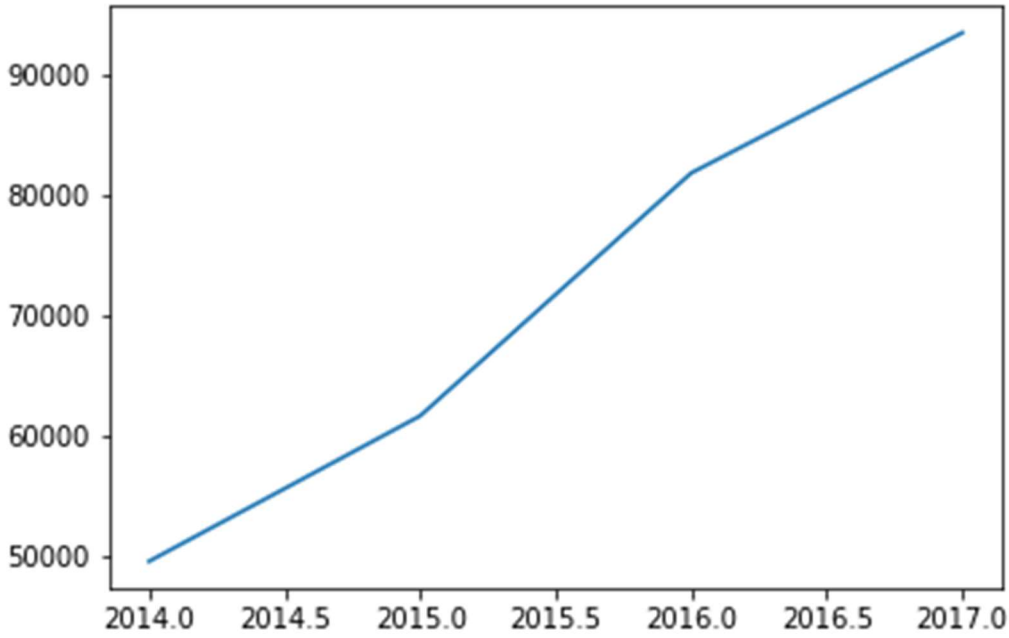
```
# Extract order year
superstore['Order Year'] = superstore['Order Date'].dt.year

# Calculate total profit for each segment each year
superstore_aggr = superstore.groupby(['Order
Year'])['Profit'].agg('sum').reset_index(name='Total Profit')

# Check data
superstore_aggr.head()
```

Out[5]:

	Order Year	Total Profit
0	2014	49543.9741
1	2015	61618.6037
2	2016	81795.1743
3	2017	93439.2696

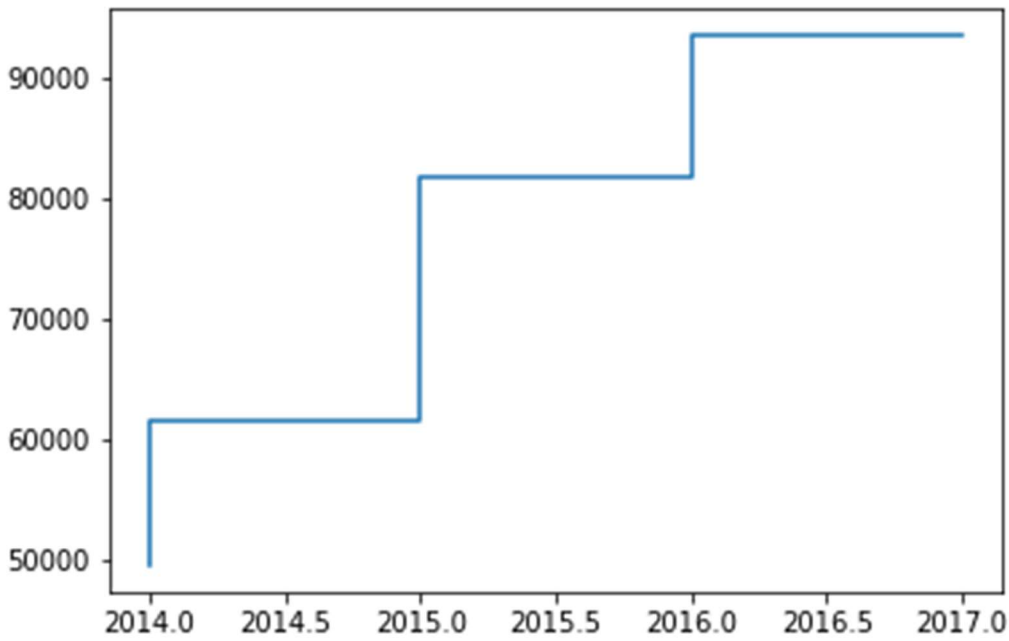
In [7]:

```
X = superstore_aggr['Order Year']
Y = superstore_aggr['Total Profit']
plt.plot(X, Y)
plt.show()
```



In [8]:

```
plt.step(X, Y)
plt.show()
```



In [ ]:

3. R – Line and Step Chart

```
# Import required packages
library('magrittr')

# Import data to be used for visualization
fileData1 = paste(getwd(), '/world-population.xlsm', sep = '')
population = xlsx::read.xlsx(fileData1, sheetIndex = 1, stringsAsFactors = FALSE)

fileData2 = paste(getwd(), '/AEP_hourly.csv', sep = '')
aep = read.csv2(fileData2, sep=',', stringsAsFactors = FALSE) %>%
    as.data.frame()

fileData3 = paste(getwd(), '/Sample - Superstore.xlsx', sep = '')
superstore = xlsx::read.xlsx(fileData3, sheetIndex = 1, stringsAsFactors = FALSE)

# Examine data
print(head(population))
print(head(aep))
print(head(superstore))
```

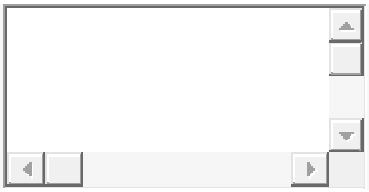
```
  Year Population
1 1960 3028654024
2 1961 3068356747
3 1962 3121963107
4 1963 3187471383
5 1964 3253112403
6 1965 3320396924
             Datetime  AEP_MW
1 2004-12-31 01:00:00 13478.0
2 2004-12-31 02:00:00 12865.0
3 2004-12-31 03:00:00 12577.0
4 2004-12-31 04:00:00 12517.0
5 2004-12-31 05:00:00 12670.0
6 2004-12-31 06:00:00 13038.0
  Row.ID       Order.ID Order.Date  Ship.Date       Ship.Mode Customer.ID
1      1 CA-2016-152156 2016-11-08 2016-11-11   Second Class    CG-12520
2      2 CA-2016-152156 2016-11-08 2016-11-11   Second Class    CG-12520
3      3 CA-2016-138688 2016-06-12 2016-06-16   Second Class    DV-13045
4      4 US-2015-108966 2015-10-11 2015-10-18 Standard Class    SO-20335
5      5 US-2015-108966 2015-10-11 2015-10-18 Standard Class    SO-20335
6      6 CA-2014-115812 2014-06-09 2014-06-14 Standard Class    BH-11710
    Customer.Name    Segment       Country            City      State
```

```
1     Claire Gute  Consumer United States       Henderson   Kentucky
2     Claire Gute  Consumer United States       Henderson   Kentucky
3 Darrin Van Huff Corporate United States     Los Angeles California
4  Sean O'Donnell  Consumer United States Fort Lauderdale    Florida
5  Sean O'Donnell  Consumer United States Fort Lauderdale    Florida
6 Brosina Hoffman  Consumer United States     Los Angeles California
  Postal.Code Region      Product.ID        Category Sub.Category
1       42420  South FUR-BO-10001798       Furniture    Bookcases
2       42420  South FUR-CH-10000454       Furniture       Chairs
3       90036   West OFF-LA-10000240 Office Supplies       Labels
4       33311  South FUR-TA-10000577       Furniture       Tables
5       33311  South OFF-ST-10000760 Office Supplies      Storage
6       90032   West FUR-FU-10001487       Furniture  Furnishings
                                                    Product.Name    Sales
1                                Bush Somerset Collection Bookcase 261.9600
2      Hon Deluxe Fabric Upholstered Stacking Chairs, Rounded Back 731.9400
3        Self-Adhesive Address Labels for Typewriters by Universal  14.6200
4                    Bretford CR4500 Series Slim Rectangular Table 957.5775
5                                  Eldon Fold 'N Roll Cart System  22.3680
6 Eldon Expressions Wood and Plastic Desk Accessories, Cherry Wood  48.8600
  Quantity Discount    Profit
1        2     0.00   41.9136
2        3     0.00  219.5820
3        2     0.00    6.8714
4        5     0.45 -383.0310
5        2     0.20    2.5164
6        7     0.00   14.1694
```

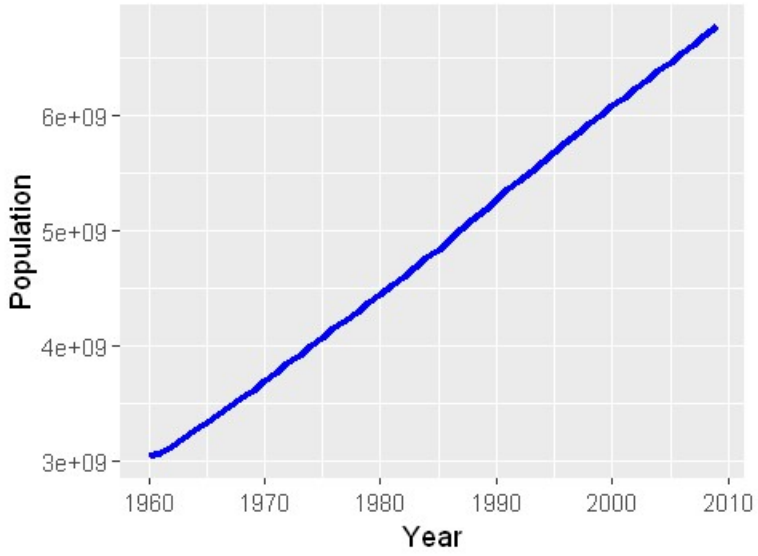
World Population data

Line and Step graph

In [2]:

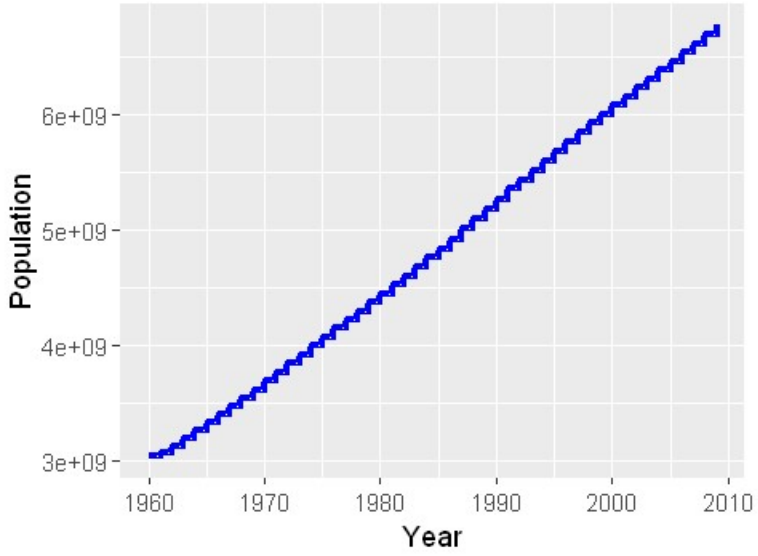


```
options(repr.plot.width = 4, repr.plot.height = 3)

ggplot2::ggplot(data=population, ggplot2::aes(x=Year, y=Population)) +
 ggplot2::geom_line(linetype='solid', color='blue', size=1.2)
```



In [3]:

```
ggplot2::ggplot(data=population, ggplot2::aes(x=Year, y=Population)) +
 ggplot2::geom_step(linetype='solid', color='blue', size=1.2)
```



AEP Data

Line and Step graph

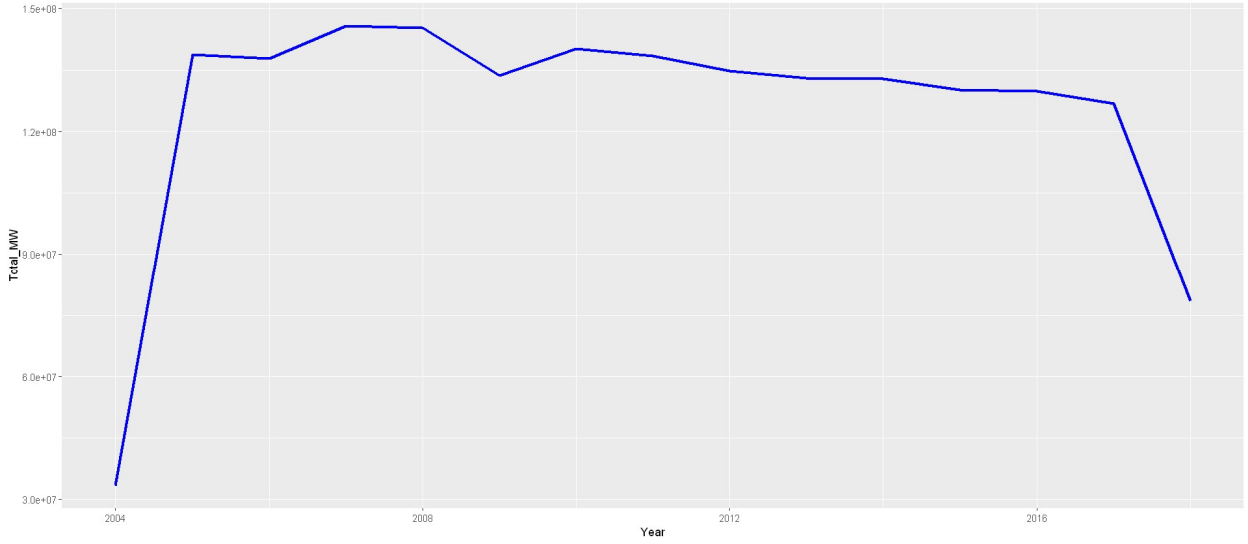
For the AEP data, there are too many observations to put in a line plot. Hence I calculated the total of AEP_MW for each year and plotted them

In [4]:

```
# Prepare dataset
aep_aggr = aep %>%
 dplyr::mutate(Year = as.numeric(format(as.Date(Datetime), '%Y')),
          AEP_MW = as.numeric(AEP_MW)) %>%
 dplyr::group_by(Year) %>%
 dplyr::summarise(Total_MW = sum(AEP_MW))
```

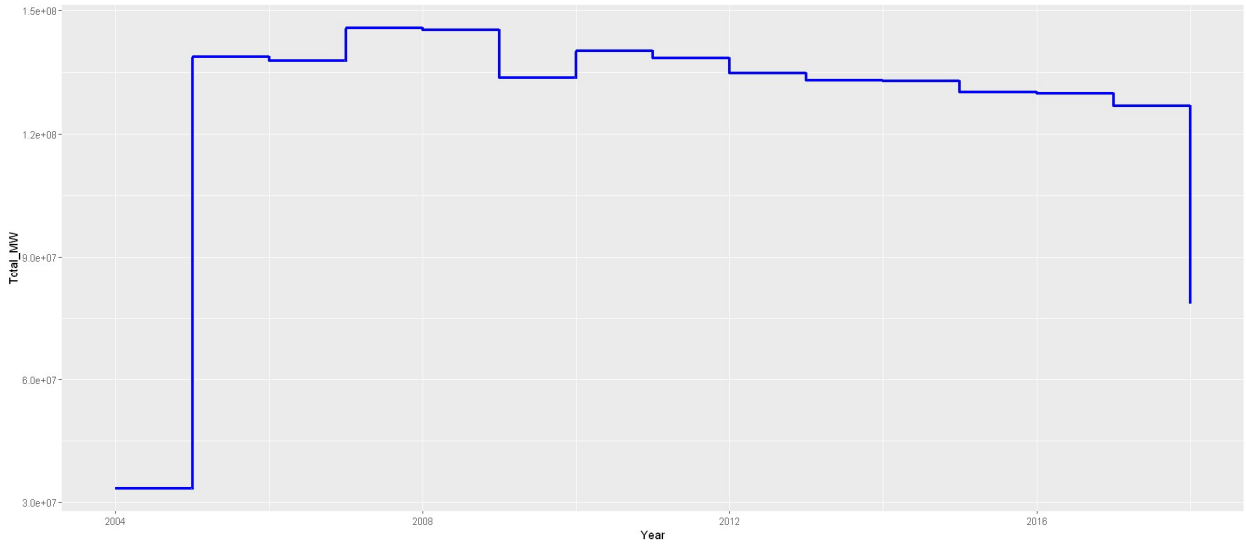
In [5]:

```
options(repr.plot.width = 16, repr.plot.height = 7)

ggplot2::ggplot(data=aep_aggr, ggplot2::aes(x=Year, y=Total_MW)) +
 ggplot2::geom_line(linetype='solid', color='blue', size=1.2)
```



In [6]:

```
ggplot2::ggplot(data=aep_aggr, ggplot2::aes(x=Year, y=Total_MW)) +
 ggplot2::geom_step(linetype='solid', color='blue', size=1.2)
```



Sample Superstore data

Line and Step graph

For this data set, I plan to plot the profit by order year and segment. This needs some additional data preparation as below.

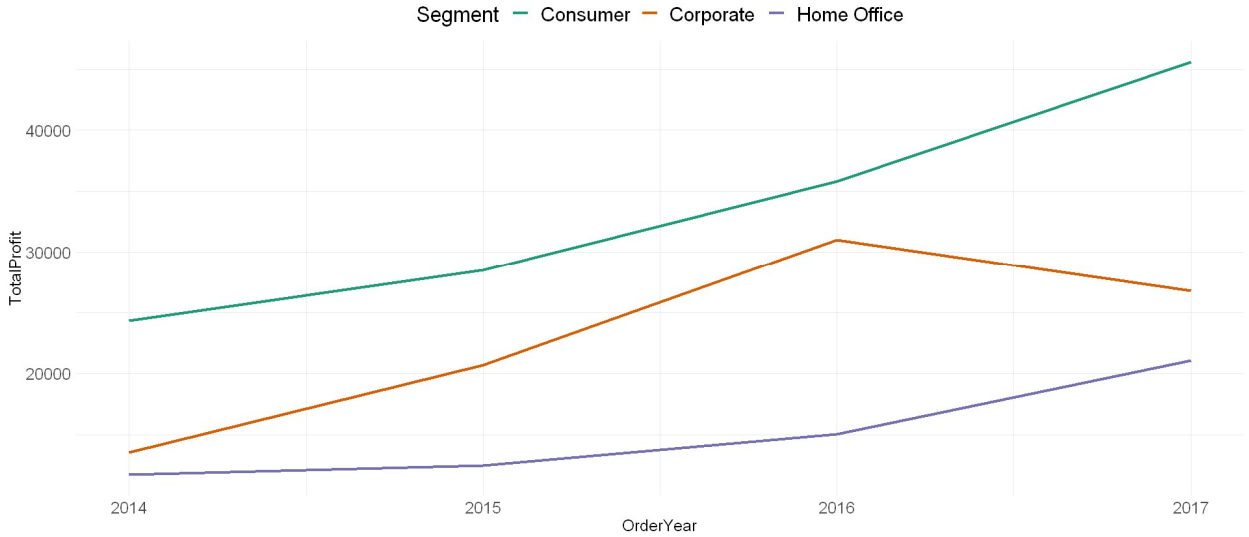
In [7]:

```
superstorePrep = superstore %>%
        dplyr::mutate(OrderYear = as.numeric(format(as.Date(Order.Date), '%Y'))) %>%
        dplyr::select(OrderYear, Segment, Profit) %>%
        dplyr::group_by(OrderYear, Segment) %>%
        dplyr::summarise(TotalProfit = sum(Profit))
```

In [8]:

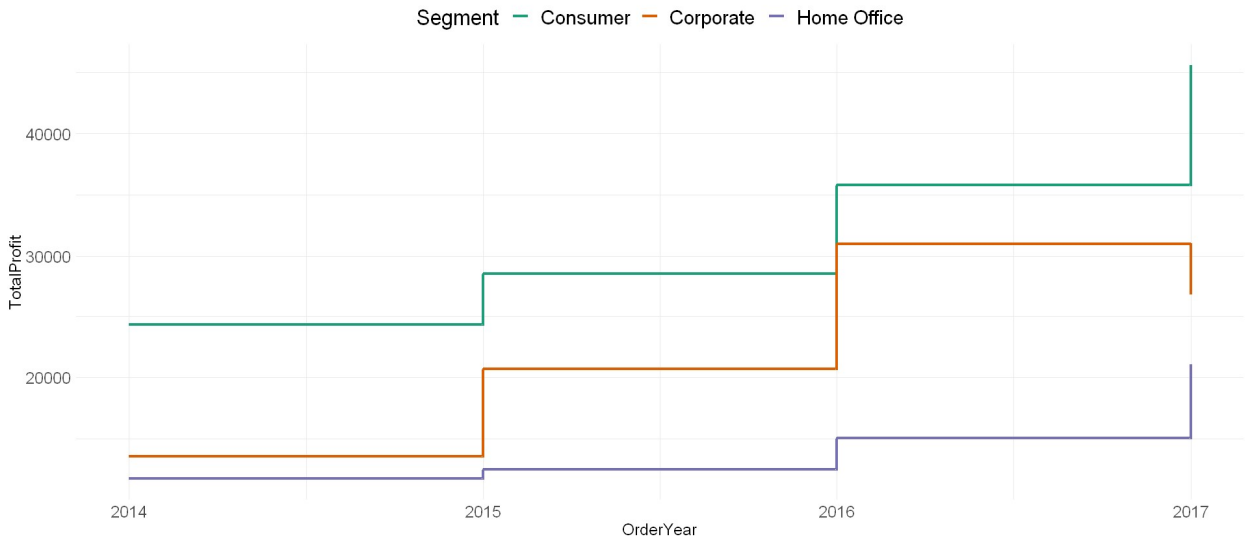
```
ggplot2::ggplot(data=superstorePrep, ggplot2::aes(x=OrderYear, y=TotalProfit, group=Segment)) +
  ggplot2::geom_line(linetype='solid', size=1.2, ggplot2::aes(color=Segment)) +
  ggplot2::scale_color_brewer(palette='Dark2') +
  ggplot2::theme_minimal() +
  ggplot2::theme(legend.position='top',
        legend.title=ggplot2::element_text(size=20),
        legend.text=ggplot2::element_text(size=18),
```

```
    axis.text=ggplot2::element_text(size=15),
    axis.title=ggplot2::element_text(size=15)
   )
```

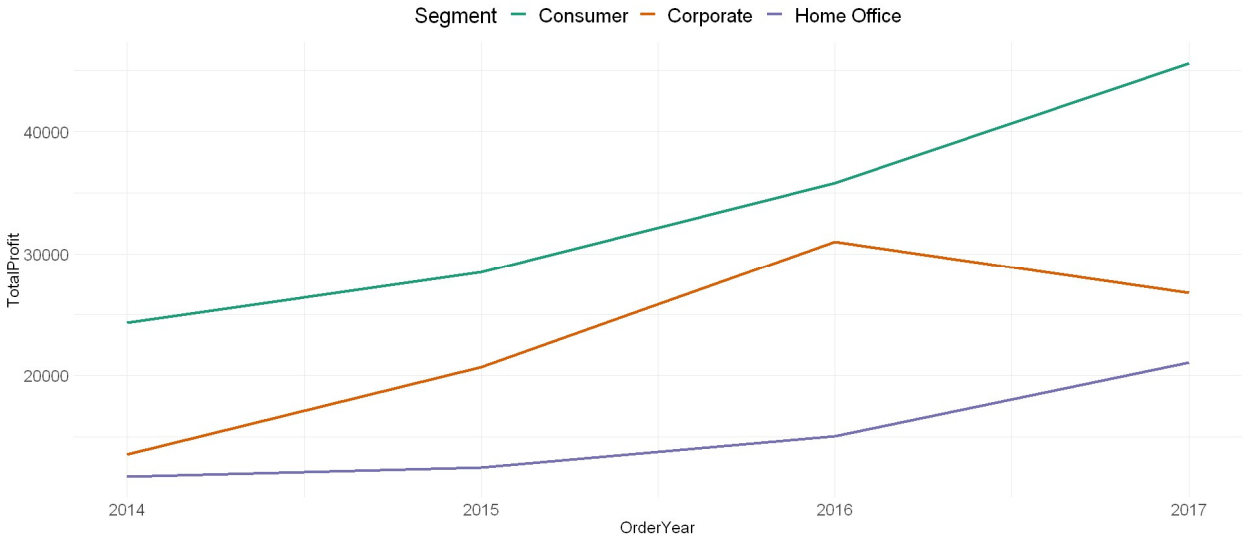


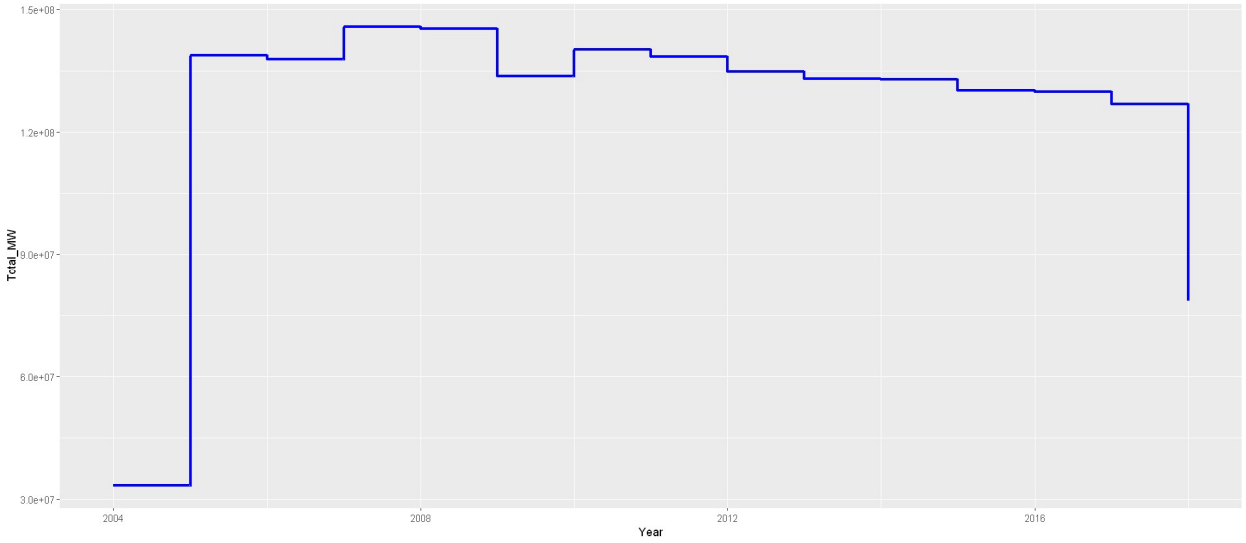
In [9]:

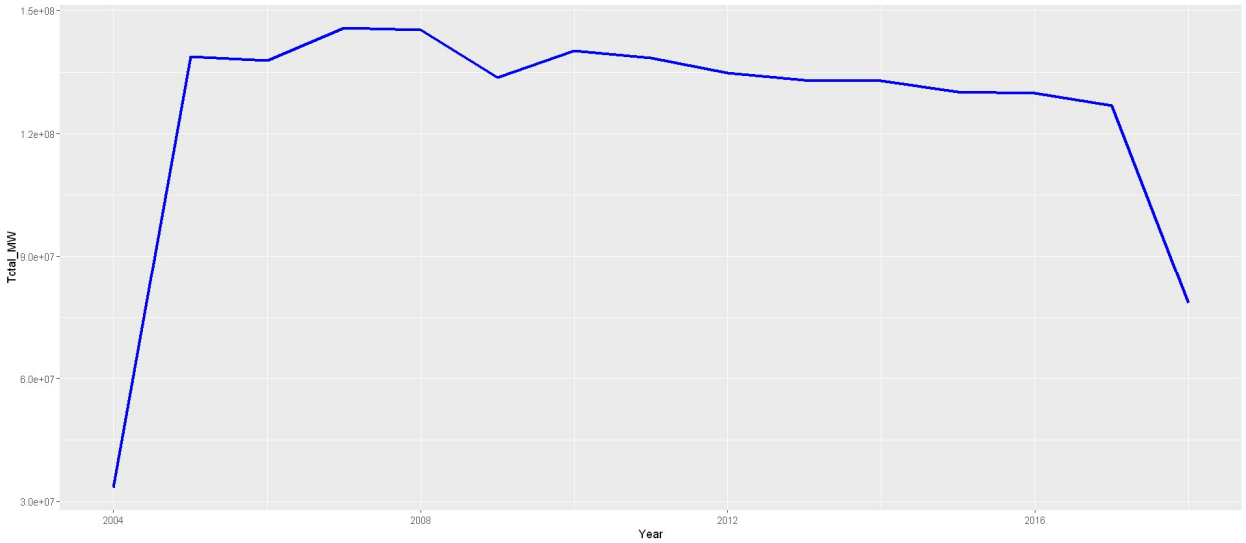
```
ggplot2::ggplot(data=superstorePrep, ggplot2::aes(x=OrderYear, y=TotalProfit, group=Segment)) +
  ggplot2::geom_step(linetype='solid', size=1.2, ggplot2::aes(color=Segment)) +
  ggplot2::scale_color_brewer(palette='Dark2') +
  ggplot2::theme_minimal() +
  ggplot2::theme(legend.position='top',
        legend.title=ggplot2::element_text(size=20),
        legend.text=ggplot2::element_text(size=18),
        axis.text=ggplot2::element_text(size=15),
        axis.title=ggplot2::element_text(size=15)
       )
```

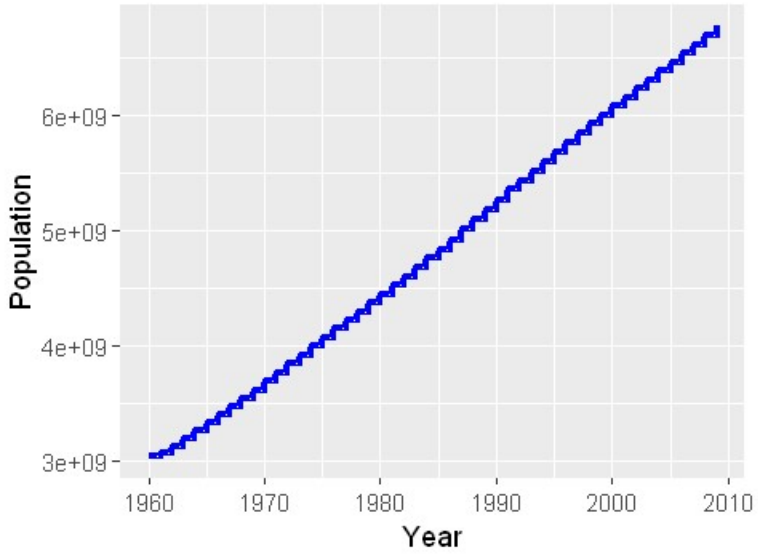

Segment
Consumer
Corporate
Home Office
40000
30000
20000
TotalProfit
2014
2015
2016
2017
OrderYear

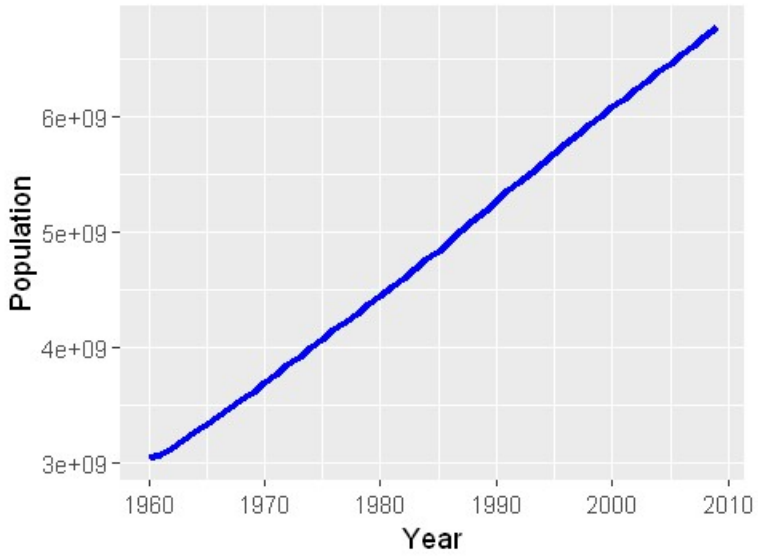
End of code

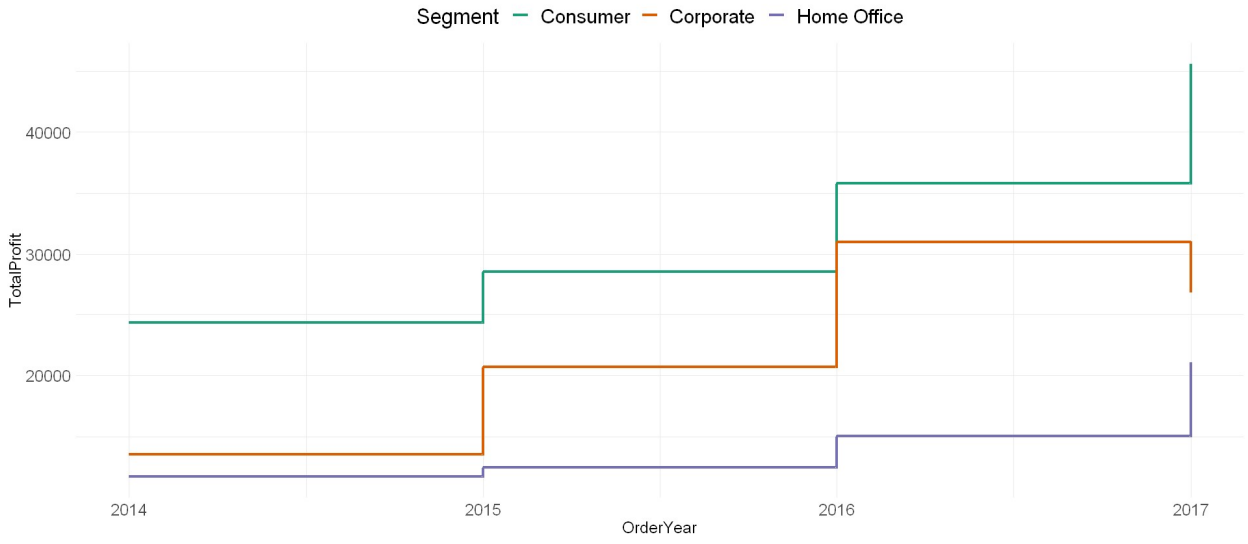

Segment
Consumer
Corporate
Home Office
40000
30000
20000
TotalProfit
2014
2015
2016
2017
OrderYear


1.5e+08
1.2e+08
9.0e+07
6.0e+07
3.0e+07
Tdal_MW
2004
2008
2012
2016
Year


1.5e+08
1.2e+08
9.0e+07
6.0e+07
3.0e+07
Tdal_MW
2004
2008
2012
2016
Year


Population
6e+09
5e+09
4e+09
3e+09
1960
1970
1980
1990
2000
2010
Year


Population
6e+09
5e+09
4e+09
3e+09
1960
1970
1980
1990
2000
2010
Year


Segment
Consumer
Corporate
Home Office
TotalProfit
40000
30000
20000
2014
2015
2016
2017
OrderYear