**Part 1**

df= {}

df['Retail\_Sales'] = fred.get\_series('RSFHFSN')

df = pd.DataFrame(df)

df

# We create a empty bracket to be able to read the Federal Reserve data named ‘RSFHFSN’

# We then put it into a dataframe with a variable name df. We then called df

**Part 2**

df.plot() # We plot the df to understand how it has changed over time

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Description automatically generated

**Part 3**

df\_1 = df.shift(1)

df\_2 = df.shift(2)

df\_3 = df.shift(3)

df\_5 = df.shift(5)

df\_10 = df.shift(10)

# We used the shift function to shift downward by x amount

# we used lag plots to visualize relationships between the current value of an observation and its previous values

# we shifted the df[Retail Sales] column 1,2,3,5, and 10 times

# Below you will see a plot. The plot is (3,2) and contains a title and data for each shift

fig, ax = plt. subplots(nrows=3, ncols=2,figsize=(18,12))

fig. suptitle('\*\*Lag Plots\*\*',fontsize=30)

ax[0,0]. scatter(df['Retail\_Sales'],df['y-1'])

ax [0,0]. set\_title('yt - y-1')

ax[0,1]. scatter(df['Retail\_Sales'],df['y-2'])

ax [0,1].set\_title('yt - y-2')

ax [1,0]. scatter(df['Retail\_Sales'], df['y-3'])

ax [1,0].set\_title('yt - y-3')

ax[1,1].scatter(df['Retail\_Sales'],df['y-5'])

ax [1,1].set\_title('yt - y-5')

ax[2,0].scatter(df['Retail\_Sales'],df['y-10'])

ax [2,0].set\_title('yt - y-10')

plt.show()

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