

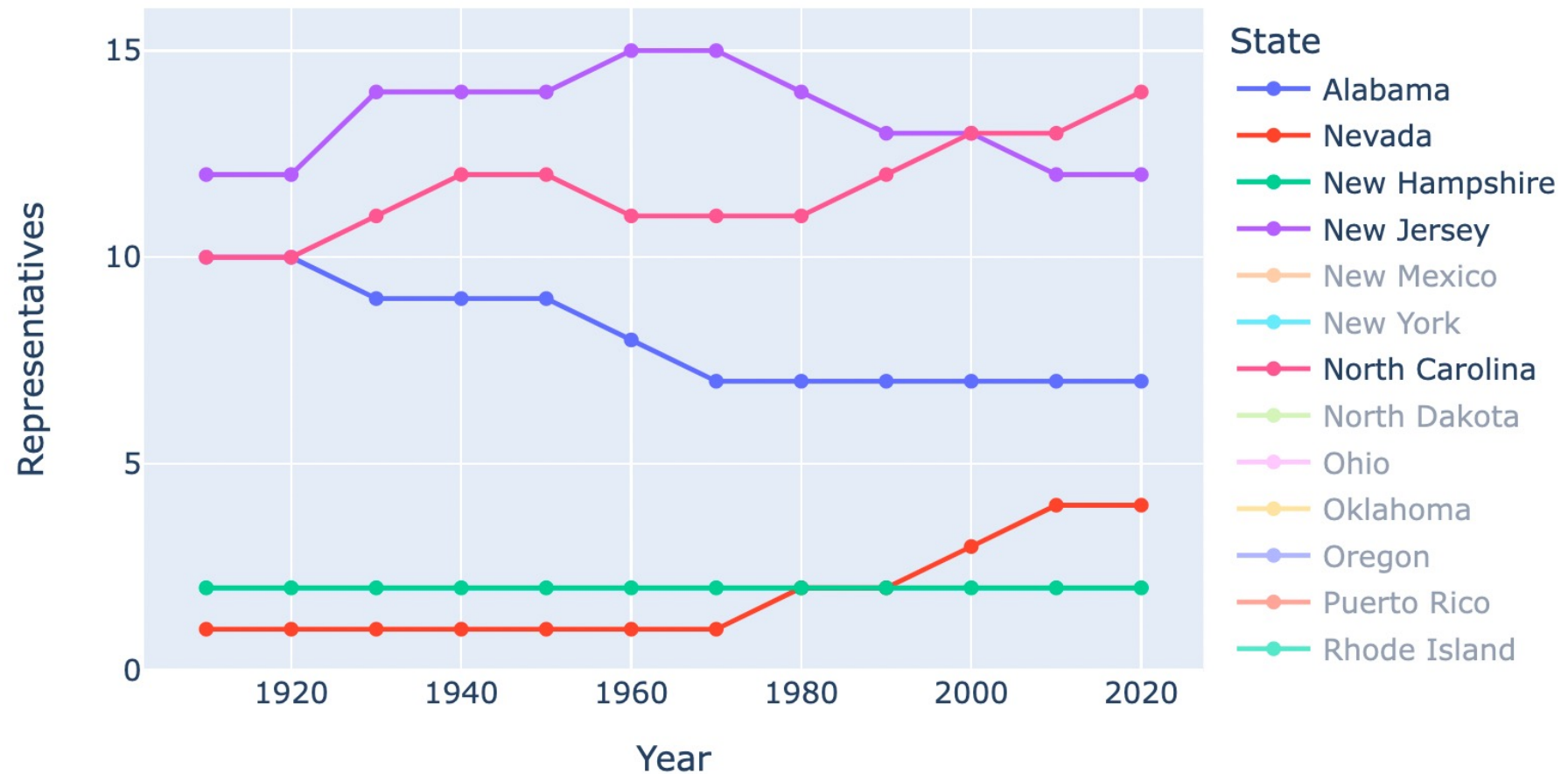
Line Charts

How to Plot Change Over Time

Think Share Activity

- What are the parts of the chart?

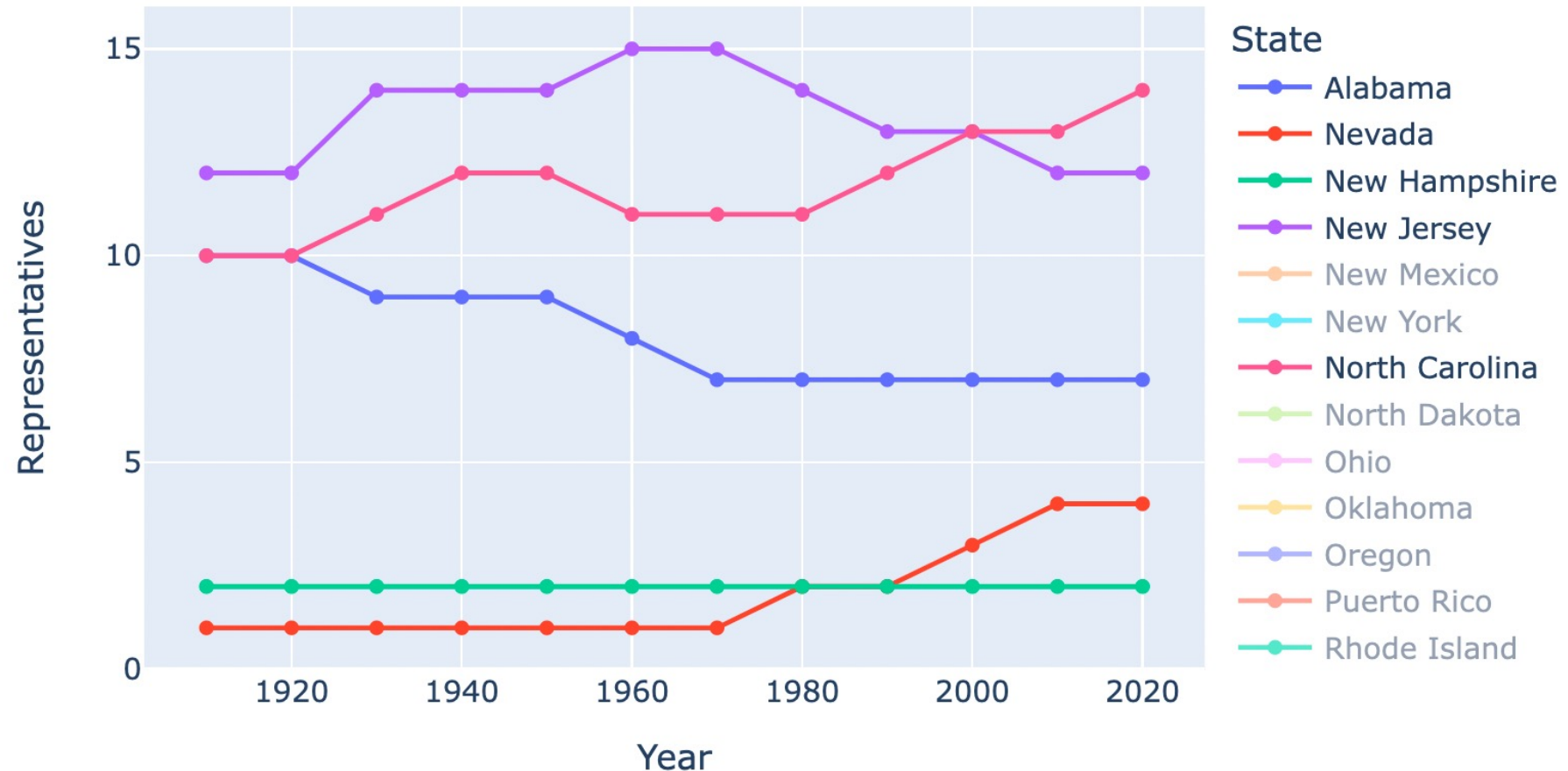
Number of US Representatives by State (1910-2020)



Parts of a Chart

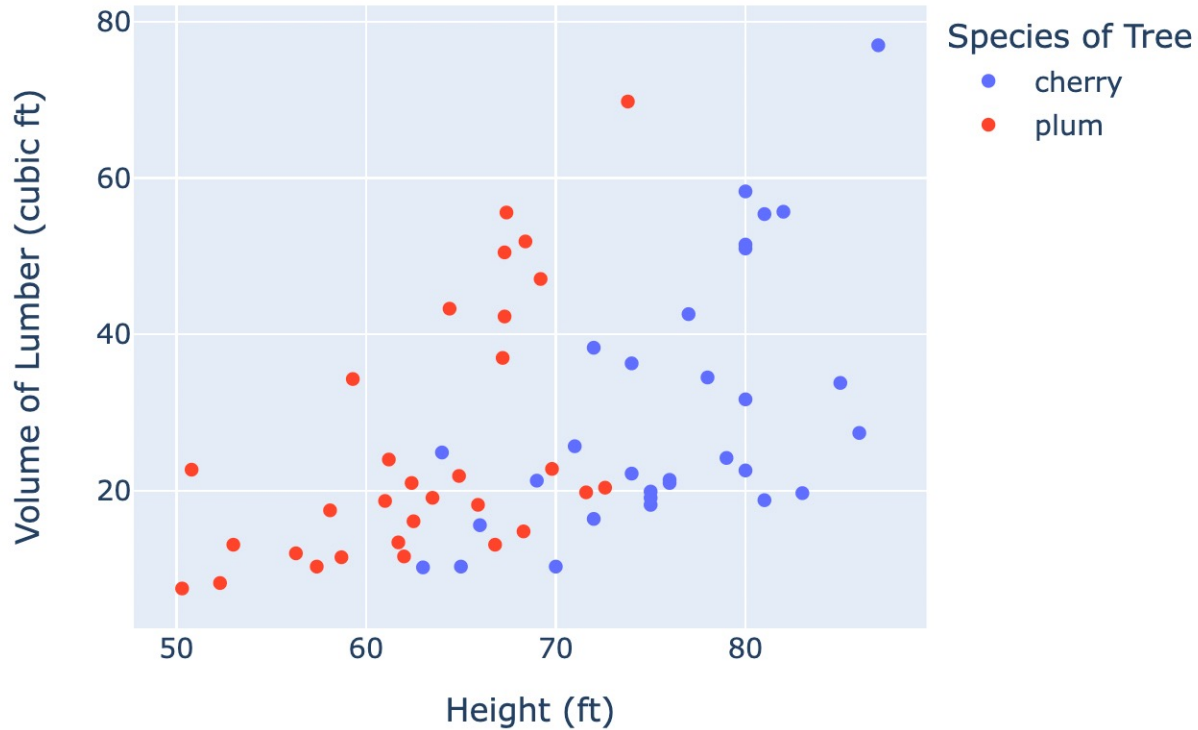
- Title
- Chart body
 - Axes
 - Coordinate space
 - Points, lines
- Axis labels
- Color legend

Number of US Representatives by State (1910-2020)

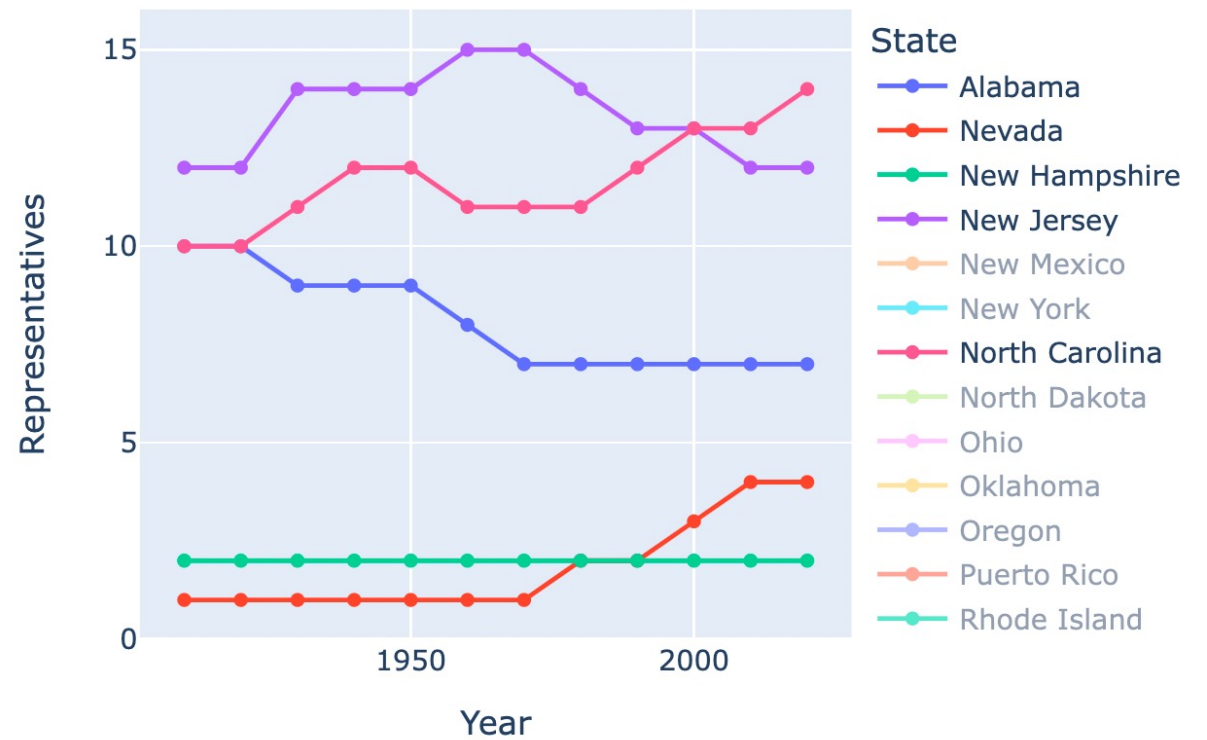


Think Share: Scatter Plots vs Line Charts

Volume of Lumber vs Height for Cherry and Plum Trees



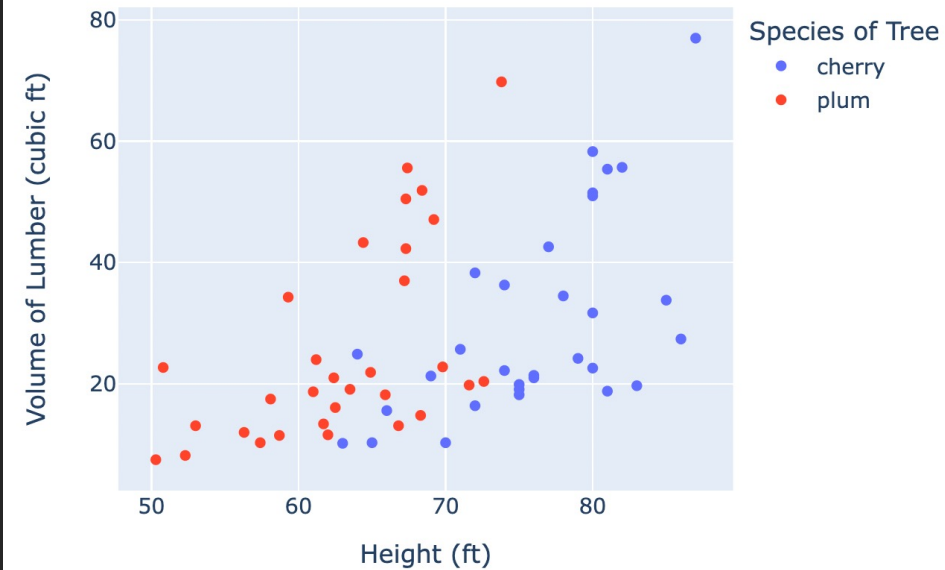
Number of US Representatives by State (1910-2020)



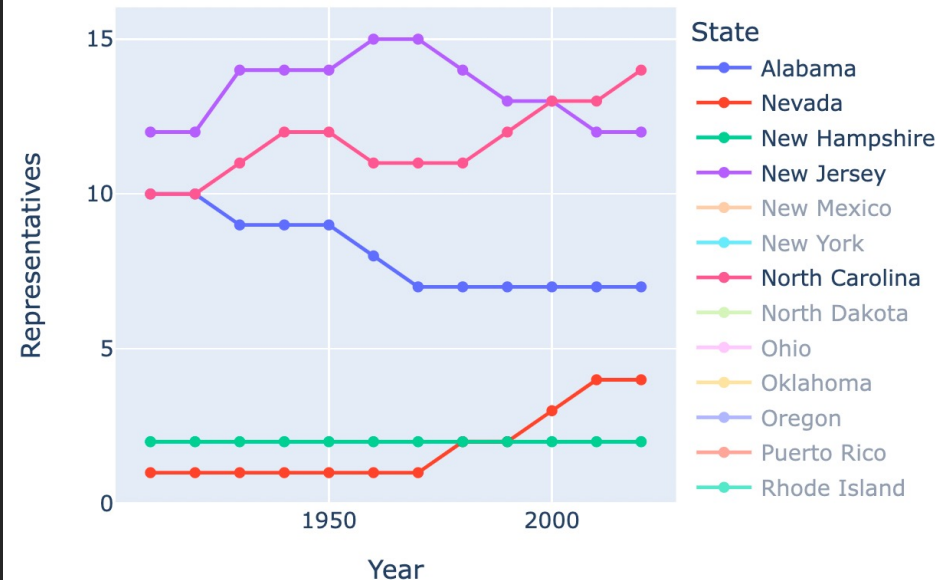
Scatter Plots vs Line Charts

- Independent variable
 - Scatter: any numerical value
 - Line: unit of time
- Number of y values for each x
 - Scatter: as many as have been observed
 - Line: only one y for each x
- Connected points
 - Scatter: no connections
 - Line: connected by line

Volume of Lumber vs Height for Cherry and Plum Trees



Number of US Representatives by State (1910-2020)

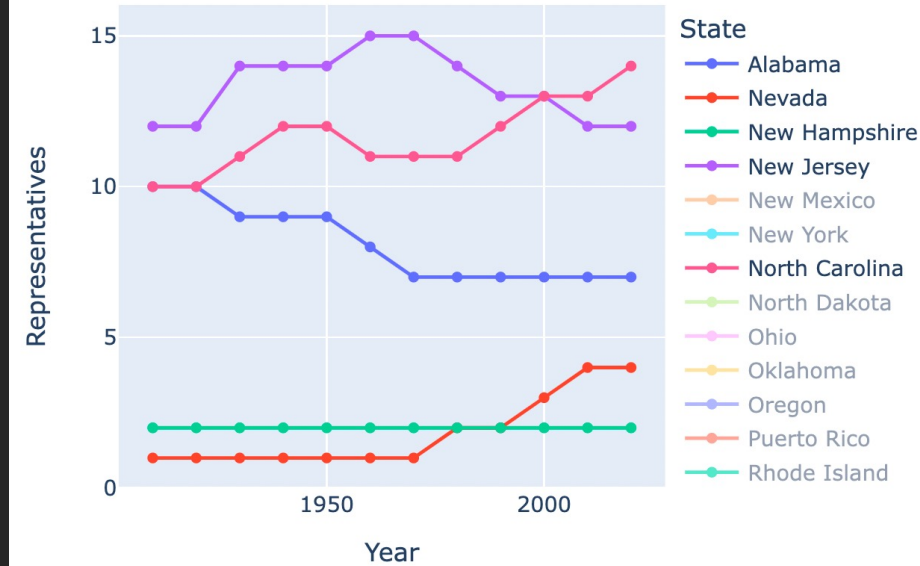


Line Charts

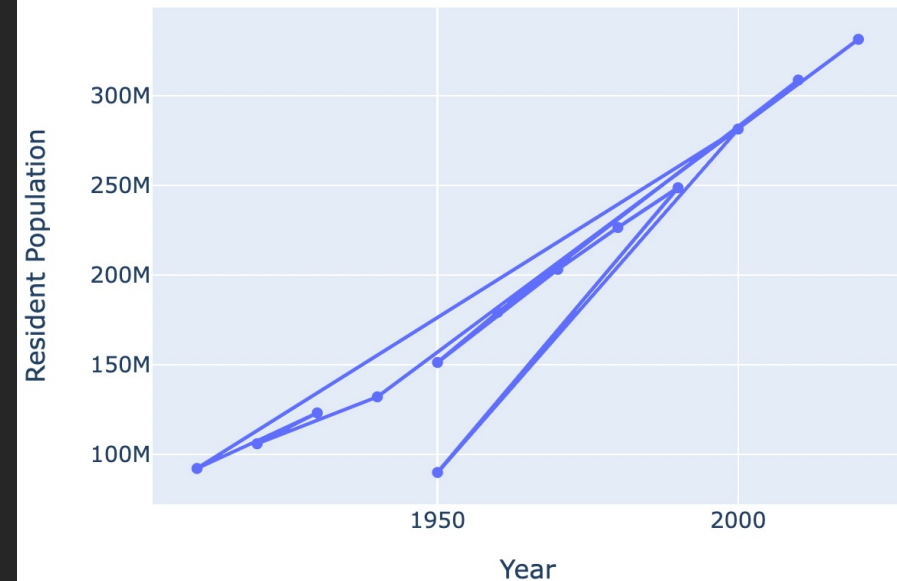
- Important! Lines should connect points in order by x axis value so the data must be sorted first!

- If we have unsorted data ... yikes

Number of US Representatives by State (1910-2020)



US Resident Population by Year (1910-2020)



How-to: Make Line Charts in Jupyter

1. Read CSV Data into Pandas Dataframe

- Import Pandas Library
- Read CSV data and Save in Variable
- Sort Data
- Display Dataframe Contents

2. Generate Plotly Line Chart

- Import Plotly Express Library
- Set Columns as x and y
- Set Additional Plot Options (Optional)
- Generate Chart

How-to: Sort Data with Blockly

```
df.sort_values(by="Year")
```



The image shows a Blockly code block for sorting data. It consists of two main parts: a 'set' block and a 'do' block. The 'set' block is purple and contains the text 'set df to'. The 'do' block is blue and contains the text 'with df do sort_values using by="Year"'. The 'sort_values' block has a dropdown arrow, and the 'by="Year"' block is a separate block with a dropdown arrow.

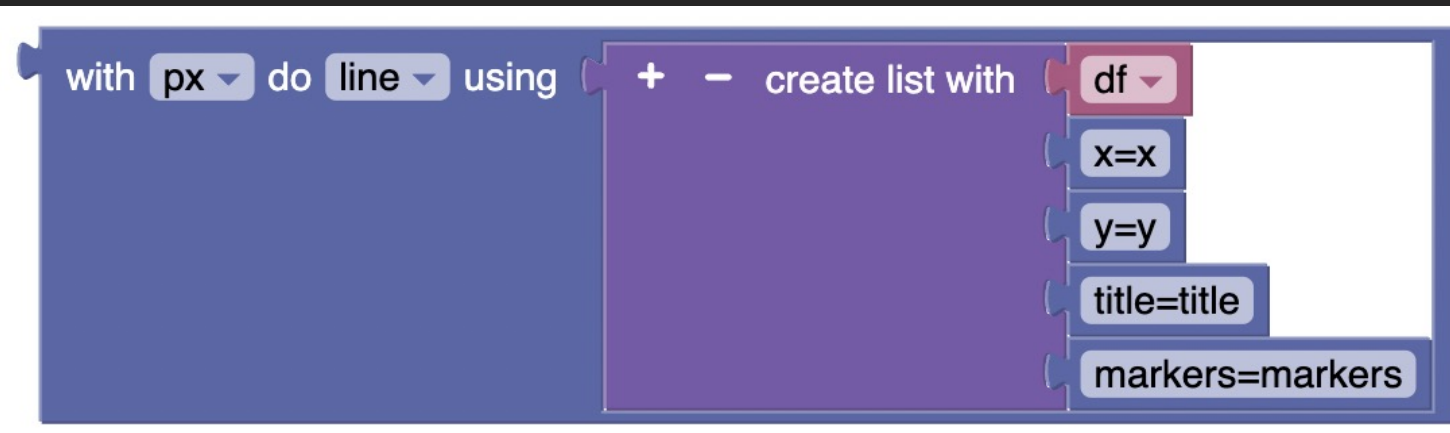
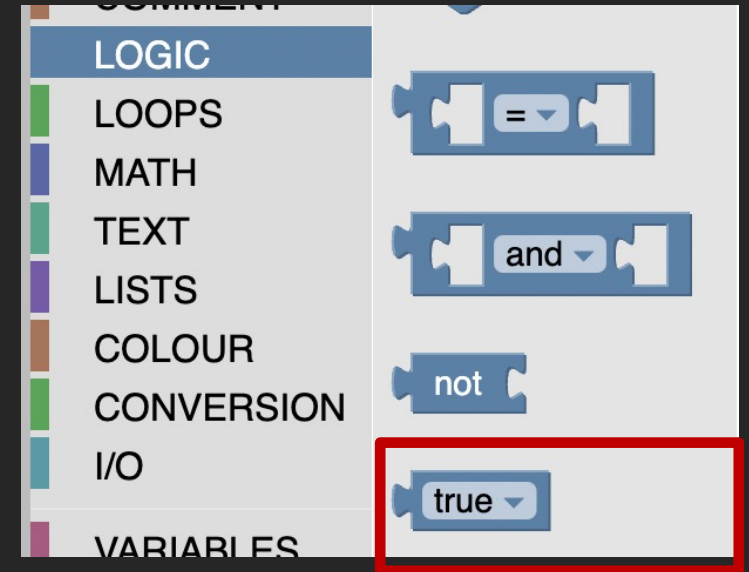
```
set df to with df do sort_values using by="Year"
```


How-to: Adding Datapoints on Line Chart

```
markers = True
```

A Scratch 'set markers to true' block. It consists of a purple 'set' block, a light blue 'markers' dropdown menu, a blue 'to' block, and a blue 'true' dropdown menu.

```
px.line(df, x=x, y=y, title=title, markers=markers)
```

A Scratch 'with px do line using' block. The block has a blue 'with px do' wrapper. Inside, there is a 'line using' block. The 'line using' block has a 'create list with' block containing five items: 'df', 'x=x', 'y=y', 'title=title', and 'markers=markers'.

Summary

- Parts of a chart
- Line charts
- Line charts vs scatter plots
- Plotly line charts with Blockly