**Example 1 – Excel File Support**

* **Pandas**: You can directly do pd.read\_excel("file.xlsx").
* **Polars**: There is no native read\_excel. You’d usually read it in Pandas first, then convert to Polars with .from\_pandas().

*Advantage*: Pandas (rich I/O support).

**Example 2 – Time Series Resampling**

* **Pandas**: Suppose you have stock prices by day and you want monthly averages. You can do:  
  df.resample("M").mean()
* **Polars**: You’d need to write more custom logic with groupby\_dynamic(), which is not as straightforward.

*Advantage*: Pandas (time series tools are more mature).

**Example 3 – MultiIndex**

* **Pandas**: You can group by ["Region", "Product"] and get a **hierarchical index** DataFrame.
* **Polars**: You only get flat groupby results; no MultiIndex exists.

*Advantage*: Pandas (MultiIndex is powerful for complex data).

**Example 4 – Pivot Tables**

* **Pandas**: One line:  
  pd.pivot\_table(df, values="Sales", index="Region", columns="Product", aggfunc="sum")
* **Polars**: You must groupby and manually reshape, which takes more steps.

*Advantage*: Pandas (easier pivoting).

**Example 5 – String Operations**

* **Pandas**:  
  df["Name"].str.contains("Smith")
* **Polars**:  
  df["Name"].str.contains("Smith") also exists, but Pandas has **dozens more** string methods (e.g., .str.extract, .str.pad, .str.wrap) that Polars doesn’t fully cover.

*Advantage*: Pandas (broader string tools).

**Example 6 – Ecosystem Integration**

* **Pandas**: Works directly with Seaborn, Scikit-learn, Statsmodels. For example, sns.barplot(data=df, x="Category", y="Sales").
* **Polars**: Most libraries don’t accept Polars DataFrames. You must convert:  
  sns.barplot(data=df.to\_pandas(), ...).

*Advantage*: Pandas (better ecosystem support).

**Example 7 – Large Datasets**

* **Polars**: If you have a 5GB CSV, Polars will load and group much faster than Pandas because it uses **Rust backend + multithreading**.
* **Pandas**: Will be slower and use more memory.

*Advantage*: Polars (speed and memory efficiency).

**Conclusion**

* Pandas = **Feature-rich, great ecosystem, best for time series, pivot tables, Excel/SQL, and string ops.**
* Polars = **Super fast, scalable, modern design, best for large data and compute-heavy operations.**