

### Tuple, List & Dictionary

**Tuples** are an **immutable** data structure.

```
x = (1, 'a', 2, 'b')
```

**Lists** are a **mutable** data structure.

```
x = [1, 'a', 2, 'b']
```

Use *append* to append an object to a list.

```
x.append(3.3) = [1, 'a', 2, 'b', 3.3]
```

**Dictionaries** associate keys with values.

```
x = {'Christopher Brooks': 'brooks@umich.edu', 'Bill Gates': 'billg-@microsoft.com'}
```

### String Manipulation

**Split a string with *split***

```
lastname = 'Christopher Arthur Hansen Brooks'.split(' ')[-1]
```

**Splice a string with *[]***

X [-1] selects the last element of the list

x[:3] *From the beginning of the string and stopping before the 3rd element.*

### Scales and Change data type

**Ratio scale:** mathematical operations of +/\* are all valid

**Interval scale:** equally spaced, but there is no true zero

**Ordinal scale:** the order of the units is important, but not evenly spaced out

**Nominal scale:** categories of data, but there is no order

### Manipulating Variable Scale Type

```
df = pd.DataFrame(['A+', 'A', 'A-'], index=['excellent', 'good', 'good'])
```

**1. Change the data type to Categorical/nominal with *astype***

```
df['Grades'].astype('category')
```

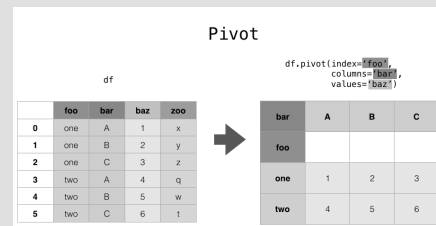
**2. Give the data a logical order with *ordered* flag**

```
df['Grades'].astype('category',
categories=['A+', 'A', 'A-'], ordered=True)
```

**3. Reducing ratio scale to interval scale with *cut***

```
pd.cut(df['avg'],3, labels=['Small', 'Medium', 'Large'])
```

### Pivot table



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