

## Using Python to Gain Insights from your Client Data

### 1. Python Basics

- Run a line of code: Shift + Enter
- Print

```
print('hello cqi conference')
```

```
hello cqi conference
```

- Assign a value to a variable

```
cqi= 8
```

```
print(cqi)
```

```
8
```

- Data types

- Integers

(whole numbers)

```
type(8)
```

```
int
```

- Floats

(decimals)

```
type(4.3)
```

```
float
```

- Strings

(text)

```
type('cat')
```

```
str
```

- Mathematical calculations

- Follows Order of Operations (PEMDAS)

Parentheses ()	Exponents **	Multiplication *	Division /	Addition +	Subtraction -
----------------	--------------	------------------	------------	------------	---------------

- Comparison Operators

- Return a value of True or False

Greater than >	Greater than or equal to >=	Less than <	Less than or equal to <=	Equal to ==	Not equal to !=
----------------	-----------------------------	-------------	--------------------------	-------------	-----------------

- Boolean Operators

AND (&)

```
(4 == 4) & (4 != 4)
```

```
False
```

OR (|)

```
(4 == 4) | (4 != 4)
```

```
True
```

- Indexing and Slicing Lists

```
treats= ['cookies', 'brownies', 'donuts', 'muffins', 'cakes']
```

0	1	2	3	4
'cookies'	'brownies'	'donuts'	'muffins'	'cakes'

First element 'cookies' is at index/position number 0

Second element 'brownies' is at index/position number 1

And so on...

0	1	2	3	4
'cookies'	'brownies'	'donuts'	'muffins'	'cakes'

treats[3]: pulls element at index 3

Result: 'muffins'

0	1	2	3	4
'cookies'	'brownies'	'donuts'	'muffins'	'cakes'

treats[0:3]: Pulls elements from index 0 up to (but not including) index 3

Result: ['cookies', 'brownies', 'donuts']

- Import NumPy, Pandas, Matplotlib Modules

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

---

- Reading a CSV file

```
meals= pd.read_csv('/content/Cafe Attendance dataset.csv')
```

---

## 2. Observing your dataset

- `.head()`: get first 5 rows of dataset

meals.head()

	Record ID: Full Name	Cafe Attendance Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Date of Birth	Gender (select all that apply):	Zip	...
0	493338	2/13/2023	Yes	Fish	NaN	NaN	Mixed Green Salad\nTomato Basil Soup\nBaked Sa...	44	Male	60640	...
1	1476	8/30/2022	No	Vegetarian/Dairy	NaN	NaN	Tossed Salad\nMinestrone Soup\nVegetarian st...	70	Male	60660	...
2	1476	9/6/2022	Yes	Fish	NaN	NaN	Mixed Green Salad\nFrench onion soup\n3 cheese...	70	Male	60660	...
3	1476	10/3/2022	No	Fish	NaN	NaN	Tossed Salad\nButternut Squash Soup\nBaked S...	70	Male	60660	...
4	1476	12/5/2022	Yes	Poultry	NaN	B Foundation	Caesar Salad\nMushroom Barley Soup\nBBQ Chicke...	70	Male	60660	...

5 rows x 25 columns

- `.tail()`: get last 5 rows of dataset

meals.tail()

	Record ID: Full Name	Cafe Attendance Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Date of Birth	Gender (select all that apply):	Zip	...
8143	540911	3/20/2023	Yes	Poultry	NaN	NaN	Tossed Salad\nCorn Chowder\nChef's Special -...	73	Male	60640	...
8144	540911	3/21/2023	Yes	Vegetarian/Dairy	Yes	A Foundation	Birthday Night\nThree Bean Salad\nButternut ...	73	Male	60640	...
8145	540911	3/23/2023	Yes	Fish	NaN	NaN	Tossed Salad\nCheddar Potato Soup\nTeriyaki ...	73	Male	60640	...
8146	540911	3/28/2023	Yes	Vegetarian/Dairy	NaN	NaN	Tossed Salad\nTomato Bisque Soup\nCheese Las...	73	Male	60640	...
8147	540911	3/30/2023	Yes	Beef	NaN	NaN	Three Bean Salad\nVegetable Soup\nChef's Spe...	73	Male	60640	...

5 rows x 25 columns

- `.sample()`: randomly select rows in dataset

meals.sample(10)

	Record ID: Full Name	Cafe Attendance Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Date of Birth	Gender (select all that apply):	Zip	...
1036	551414	7/19/2022	Yes	Beef	NaN	NaN	Tossed salad\nHamburgers on a bun\nmashed po...	69	Male	60640	...
3317	572992	6/1/2023	No	Poultry	NaN	C Foundation	Tossed salad\nminestrone soup\nchicken stir-fr...	31	Male	60640	...
866	588568	3/13/2023	Yes	Beef	NaN	NaN	Cucumber Salad\nSplit Pea Soup\nItalian Beef...	62	Female	60640	...
4039	190795	6/15/2023	Yes	Poultry	NaN	C Foundation	Mixed green salad w/poppysseed dressing and sug...	72	Male	60607	...
87	709	8/7/2022	No	Bagel Brunch	NaN	NaN	Bagels with cream cheese\nOatmeal with raisi...	72	Female	60640	...
3491	568498	6/6/2023	Yes	Beef	NaN	C Foundation	Coleslaw\nZucchini soup\nHamburgers\nHome frie...	62	Male	60640	...
3994	600269	6/6/2023	No	Beef	NaN	C Foundation	Coleslaw\nZucchini soup\nHamburgers\nHome frie...	76	Male	60640	...
2260	539388	1/29/2023	Yes	Meat Brunch	NaN	NaN	Whole Wheat Toast\nEgg Souffle\nMeat Knishes...	63	Male	60640	...
4449	362061	6/29/2023	Yes	Beef	NaN	C Foundation	Tossed Salad w/ Honey Mustard\nDressing and Sug...	46	Male	60640	...
3614	608517	6/19/2023	Yes	Meat Brunch	NaN	C Foundation	Mixed greens salad w/french dressing and sugar...	69	Male	60626	...

10 rows x 25 columns

- `.shape`: (number of rows, number of columns)

```
meals.shape
```

```
(8148, 25)
```

- `.size`: number of rows \* number of columns

```
meals.size
```

```
203700
```

- `.columns`: show full list of column names

```
meals.columns
```

```
Index(['Record ID: Full Name', 'Cafe Attendance Date', 'To-Go Meal?',
      'Meal Type', 'Theme Night', 'Sponsored Meal', 'Notes', 'Date of Birth',
      'Gender (select all that apply):', 'Zip',
      'Does client have a disability? (client...',
      'Total number in household', 'Race/Ethnicity',
      'Total number of children in household', 'Primary language spoken',
      'Referral Source (How did you hear about...', 'Living Arrangements',
      'SNAP', 'SNAP Amount', 'Monthly Subtotal income (no SNAP)', 'Record ID',
      'Email', 'Email Preference', 'Creation Date', 'Created By'],
      dtype='object')
```

- `.info()`: get each column's name, index number, number of non-NA elements and data type

```
meals.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8148 entries, 0 to 8147
Data columns (total 25 columns):
#   Column                                     Non-Null Count  Dtype
---  ---
0   Record ID: Full Name                     8148 non-null   int64
1   Cafe Attendance Date                     8148 non-null   object
2   To-Go Meal?                             8148 non-null   object
3   Meal Type                               8148 non-null   object
4   Theme Night                             1488 non-null   object
5   Sponsored Meal                           1797 non-null   object
6   Notes                                   8147 non-null   object
7   Date of Birth                           8148 non-null   int64
8   Gender (select all that apply):          8148 non-null   object
9   Zip                                      8142 non-null   object
10  Does client have a disability? (client... 8148 non-null   object
11  Total number in household                 8148 non-null   int64
12  Race/Ethnicity                           8148 non-null   object
13  Total number of children in household     8148 non-null   int64
14  Primary language spoken                  8148 non-null   object
15  Referral Source (How did you hear about... 8147 non-null   object
16  Living Arrangements                      8148 non-null   object
17  SNAP                                     8148 non-null   object
18  SNAP Amount                             8148 non-null   int64
19  Monthly Subtotal income (no SNAP)        8148 non-null   int64
20  Record ID                               8148 non-null   int64
21  Email                                    3613 non-null   object
22  Email Preference                         6 non-null      object
23  Creation Date                           8148 non-null   object
24  Created By                              8148 non-null   object
dtypes: int64(7), object(18)
memory usage: 1.6+ MB
```

- `.describe()`: get basic stats for your numerical data

```
meals.describe()
```

	Record ID: Full Name	Date of Birth	Total number in household	Total number of children in household	SNAP Amount	Monthly Subtotal income (no SNAP)	Record ID
count	8148.000000	8148.000000	8148.000000	8148.000000	8148.000000	8148.000000	8148.000000
mean	328578.970422	65.188635	1.369048	0.324374	85.881566	805.291973	600548.929431
std	220673.237012	11.030544	1.098515	0.813209	103.111362	468.209309	11922.011595
min	512.000000	26.000000	0.000000	0.000000	0.000000	0.000000	581271.000000
25%	98829.500000	62.000000	1.000000	0.000000	0.000000	695.000000	589011.750000
50%	366396.000000	67.000000	1.000000	0.000000	35.000000	823.000000	602704.500000
75%	533434.000000	72.000000	1.000000	0.000000	136.000000	1064.000000	610394.250000
max	616888.000000	85.000000	6.000000	4.000000	1100.000000	2146.000000	619083.000000

- Locational indexing

`dataFrame.loc[row index, 'column name']`

```
meals.loc[100]
```

```
meals.loc[100:110]
```

Record ID: Full Name	709
Cafe Attendance Date	8/29/2022
To-Go Meal?	Yes
Meal Type	Poultry
Theme Night	NaN
Sponsored Meal	NaN
Notes	Cucumber and onion salad \nVegetable soup \nCh...
Date of Birth	72
Gender (select all that apply):	Female
Zip	60640
Does client have a disability? (client...	Yes
Total number in household	2
Race/Ethnicity	Caucasian/White
Total number of children in household	1
Primary language spoken	English
Referral Source (How did you hear about...	Friend/Family
Living Arrangements	Subsidized Apartment
SNAP	Yes
SNAP Amount	15
Monthly Subtotal income (no SNAP)	721
Record ID	585188
Email	b@gmail.com
Email Preference	NaN
Creation Date	8/31/2022 12:09
Created By	AB

dtype: object

Record ID: Full Name	Cafe Attendance Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Date of Birth	Gender (select all that apply):	Zip
100	709	8/29/2022	Yes	Poultry	NaN	Cucumber and onion salad \nVegetable soup \nCh...	72	Female	60640
101	709	8/30/2022	No	Vegetarian/Dairy	NaN	Tossed Salad \nMinestrone Soup \nVegetarian st...	72	Female	60640
102	709	9/1/2022	No	Beef	NaN	Tossed Salad \nSplit Pea Soup \nBBQ Beef \nMas...	72	Female	60640
103	709	9/4/2022	No	Bagel Brunch	NaN	Bagels with cream cheese\nVegetable souffle \n...	72	Female	60640
104	709	9/5/2022	No	Beef	Yes	Labor Day Brunch! \nCucumber Salad \nVegetable...	72	Female	60640
105	709	9/6/2022	No	Fish	NaN	Mixed Green Salad \nFrench onion soup \n3 chee...	72	Female	60640
106	709	9/8/2022	No	Beef	NaN	Tossed salad \nlentil soup \nItalian beef\nsau...	72	Female	60640
107	709	9/12/2022	No	Poultry	NaN	Coleslaw \n3 bean soup \nchef's special - stuf...	72	Female	60640
108	709	10/2/2022	No	Bagel Brunch	NaN	Bagels with cream cheese \noatmeal \nScrambled...	72	Female	60640
109	709	10/3/2022	No	Fish	NaN	Tossed Salad \nButternut Squash Soup \nBaked S...	72	Female	60640
110	709	10/6/2022	No	Poultry	Yes	Birthday Night! \nCaesar Salad \nmushroom barl...	72	Female	60640

11 rows x 25 columns

```
meals.loc[100:110, 'Meal Type']
```

```
meals.loc[100, 'Meal Type': 'Notes']
```

```
meals.loc[100:110, 'Meal Type': 'Notes']
```

	Meal Type	Theme Night	Sponsored Meal	Notes
100	Poultry	NaN	NaN	Cucumber and onion salad \nVegetable soup \nCh...
101	Vegetarian/Dairy	NaN	NaN	Tossed Salad \nMinestrone Soup \nVegetarian st...
102	Beef	NaN	NaN	Tossed Salad \nSplit Pea Soup \nBBQ Beef \nMas...
103	Bagel Brunch	NaN	NaN	Bagels with cream cheese\nVegetable souffle \n...
104	Beef	Yes	NaN	Labor Day Brunch! \nCucumber Salad \nVegetable...
105	Fish	NaN	NaN	Mixed Green Salad \nFrench onion soup \n3 chee...
106	Beef	NaN	NaN	Tossed salad \nlentil soup \nItalian beef\nsau...
107	Poultry	NaN	NaN	Coleslaw \n3 bean soup \nchef's special - stuf...
108	Bagel Brunch	NaN	NaN	Bagels with cream cheese \noatmeal \nScrambled...
109	Fish	NaN	NaN	Tossed Salad \nButternut Squash Soup \nBaked S...
110	Poultry	Yes	NaN	Birthday Night! \nCaesar Salad \nmushroom barl...

### 3. Data Cleaning and Manipulation

- Renaming columns

```
meals.rename(columns= {'Record ID: Full Name':'Client Name', 'Cafe Attendance Date':'Meal Date',  
                      'Date of Birth':'Age', 'Gender (select all that apply)':'Gender',  
                      'Does client have a disability? (client...':'Disability',  
                      'Monthly Subtotal income (no SNAP)':'Monthly Income'}, inplace= True)
```

- Removing columns

```
meals.drop(['Record ID', 'Email', 'Email Preference', 'Creation Date', 'Created By'], axis=1,  
          inplace= True)
```

- Sorting columns

```
meals.sort_values(by= 'Age')
```

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Age
2790	585809	9/21/2022	Yes	Fish	NaN	NaN	COLD MEAL\nBagel and Lox w/ Cream Cheese\nBag...	26
2789	585809	9/20/2022	No	Fish	NaN	NaN	Corn Salad\nCream of Mushroom\nBaked Tilapia...	26
2788	585809	9/19/2022	No	Vegetarian/Dairy	NaN	NaN	Mixed Green Salad\nTortilla Soup\nTamales\nRic...	26
2791	585809	9/22/2022	No	Poultry	Yes	A Foundation	Mixed Green Salad\nPotato Soup\nChicken Stir F...	26
3377	601225	6/6/2023	Yes	Beef	NaN	C Foundation	Coleslaw\nZucchini soup\nHamburgers\nHome frie...	29
...	...	...	...	...	...	...	...	...
6067	646	7/31/2022	Yes	Meat Brunch	NaN	NaN	Whole wheat toast\nDeli roll\nVegetable frit...	85
6089	646	3/19/2023	Yes	Bagel Brunch	NaN	NaN	Whole Wheat Toast\nScrambled Eggs\nVaffles a...	85
6088	646	3/12/2023	Yes	Bagel Brunch	NaN	NaN	Bagels with Cream Cheese\nOatmeal\nMushroom & ...	85
6090	646	3/26/2023	Yes	Bagel Brunch	NaN	NaN	Bagels with Cream Cheese\nScrambled Eggs\nBr...	85
6083	646	1/15/2023	Yes	Meat Brunch	NaN	NaN	Whole Wheat Toast\nOatmeal w/ brown sugar and ...	85

8148 rows x 20 columns

```
meals.sort_values(by= 'Age', ascending= False)
```

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Age
6064	646	7/12/2022	Yes	Vegetarian/Dairy	NaN	NaN	Citrus black bean salad\nTortilla soup\nVege...	85
6063	646	7/11/2022	Yes	Poultry	Yes	NaN	Patriotic Night\n3 bean salad\nCorn chowder...	85
6062	646	7/10/2022	Yes	Bagel Brunch	NaN	NaN	Bagels with cream cheese\nPancakes with syrup...	85
6080	646	12/22/2022	Yes	Poultry	Yes	E Foundation	Holiday Brunch\nRamen\nColeslaw\nSesame Chick...	85
6079	646	12/11/2022	Yes	Bagel Brunch	NaN	B Foundation	Bagels with Cream Cheese\nVegetable Fritata\n...	85
...	...	...	...	...	...	...	...	...
740	601225	2/7/2023	No	Fish	NaN	NaN	Tossed Salad\nSplit Pea Soup\nChef's Special- ...	29
2791	585809	9/22/2022	No	Poultry	Yes	A Foundation	Mixed Green Salad\nPotato Soup\nChicken Stir F...	26
2790	585809	9/21/2022	Yes	Fish	NaN	NaN	COLD MEAL\nBagel and Lox w/ Cream Cheese\nBag...	26
2789	585809	9/20/2022	No	Fish	NaN	NaN	Corn Salad\nCream of Mushroom\nBaked Tilapia...	26
2788	585809	9/19/2022	No	Vegetarian/Dairy	NaN	NaN	Mixed Green Salad\nTortilla Soup\nTamales\nRic...	26

8148 rows x 20 columns

### 4. Data Analysis and Manipulation

- Pulling columns

```
meals['Meal Type']
```

	Meal Type
0	Fish
1	Vegetarian/Dairy
2	Fish
3	Fish
4	Poultry
...	...
8143	Poultry
8144	Vegetarian/Dairy
8145	Fish
8146	Vegetarian/Dairy
8147	Beef

8148 rows x 1 columns

dtype: object

- Calculating Value counts

<code>meals['Meal Type'].value_counts()</code>	<code>meals['Meal Type'].value_counts(normalize= True)</code>
<pre> count Meal Type Poultry    2279 Beef       2002 Fish       1286 Vegetarian/Dairy  951 Bagel Brunch  944 Meat Brunch  686 dtype: int64 </pre>	<pre> proportion Meal Type Poultry    0.279701 Beef       0.245704 Fish       0.157830 Vegetarian/Dairy  0.116716 Bagel Brunch  0.115857 Meat Brunch  0.084192 dtype: float64 </pre>

- Applying a Filter

meals[meals['Meal Type']!= 'Fish']

Meal Type

0

True

1

False

2

True

3

True

4

False

...

...

8143

False

8144

False

8145

True

8146

False

8147

False

8148 rows x 1 columns

dtype: bool

meals[meals['Meal Type']!= 'Fish']

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal		Notes	Age	Gender	Zip	Disability
0	493338	2/13/2023	Yes	Fish	NaN	NaN	Mixed Green Salad	Tomato Basil Soup	44	Male	60640	No
2	1476	9/6/2022	Yes	Fish	NaN	NaN	Mixed Green Salad	French onion soup	70	Male	60660	No
3	1476	10/3/2022	No	Fish	NaN	NaN	Tossed Salad	Butternut Squash Soup	70	Male	60660	No
5	1476	1/17/2023	No	Fish	NaN	NaN	Mixed Salad w/ honey mustard dressing	Low So...	70	Male	60660	No
7	1476	2/7/2023	No	Fish	NaN	NaN	Tossed Salad	Split Pea Soup	70	Male	60660	No
...	...	...	...	...	...	...	...	...	...	...	...	...
8080	595102	3/23/2023	No	Fish	NaN	NaN	Tossed Salad	Cheddar Potato Soup	62	Female	60640	No
8119	540911	1/3/2023	Yes	Fish	NaN	NaN	Tossed Salad	Low Sodium Tomato Bisque	73	Male	60640	Yes
8122	540911	1/17/2023	Yes	Fish	NaN	NaN	Mixed Salad w/ honey mustard dressing	Low So...	73	Male	60640	Yes
8132	540911	2/13/2023	Yes	Fish	NaN	NaN	Mixed Green Salad	Tomato Basil Soup	73	Male	60640	Yes
8145	540911	3/23/2023	Yes	Fish	NaN	NaN	Tossed Salad	Cheddar Potato Soup	73	Male	60640	Yes

1286 rows x 20 columns



0 False

1 True

2 True

**3** True

4 True

• • • • •

8143 True

8144 True

8145 True

8146 True

8147 True

dtype: bool

[illegible]

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal		Notes	Age	Gender	Zip	Disability
2	1476	9/6/2022	Yes	Fish	NaN	NaN	Mixed Green Salad	French onion soup	70	Male	60660	No
3	1476	10/3/2022	No	Fish	NaN	NaN	Tossed Salad	Butternut Squash Soup	70	Male	60660	No
5	1476	1/17/2023	No	Fish	NaN	NaN	Mixed Salad w/ honey mustard dressing	Low So...	70	Male	60660	No
7	1476	2/7/2023	No	Fish	NaN	NaN	Tossed Salad	Split Pea Soup	70	Male	60660	No
78	709	7/7/2022	No	Fish	NaN	NaN	Tossed Salad	Vegetable Soup	72	Female	60640	Yes
...	...	...	...	...	...	...	...	...	...	...	...	...
7981	190795	3/27/2023	Yes	Fish	NaN	NaN	Tossed Salad	Tortilla Soup	72	Male	60607	No
8119	540911	1/3/2023	Yes	Fish	NaN	NaN	Tossed Salad	Low Sodium Tomato Bisque	73	Male	60640	Yes
8122	540911	1/17/2023	Yes	Fish	NaN	NaN	Mixed Salad w/ honey mustard dressing	Low So...	73	Male	60640	Yes
8132	540911	2/13/2023	Yes	Fish	NaN	NaN	Mixed Green Salad	Tomato Basil Soup	73	Male	60640	Yes
8145	540911	3/23/2023	Yes	Fish	NaN	NaN	Tossed Salad	Cheddar Potato Soup	73	Male	60640	Yes

8



- Unique Counts

```
meals['Client Name'].nunique()
```

208

```
meals['Meal Date'].nunique()
```

183

- Unduplicating a data frame

```
meals2= meals.drop_duplicates('Client Name')
```

meals2

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Age	Gender	Zip	0
0	493338	2/13/2023	Yes	Fish	NaN	NaN	Mixed Green Salad\nTomato Basil Soup\nBaked Sa...	44	Male	60640	
1	1476	8/30/2022	No	Vegetarian/Dairy	NaN	NaN	Tossed Salad\nMinestrone Soup\nVegetarian St...	70	Male	60660	
10	583804	11/13/2022	No	Bagel Brunch	NaN	NaN	Bagels with cream cheese\nFrench toast\nscra...	65	Female	60660	
12	473232	11/24/2022	Yes	Poultry	Yes	NaN	Thanksgiving Brunch\nMixed Greens\nVegetabi...	59	Female	60640	
13	290239	11/3/2022	No	Poultry	NaN	NaN	Beet and apple salad\ncream of cauliflower SO...	67	Male	60640	
7838	459409	7/18/2022	Yes	Poultry	NaN	NaN	Carrot and Bok Choy\nSlaw\nEgg Drop Soup\nchic...	60	Male	60640	
7848	581473	8/11/2022	No	Beef	NaN	NaN	Caesar salad\nFrench onion soup\nbeef stir f...	68	Female	60660	
7851	122291	10/6/2022	Yes	Poultry	Yes	NaN	Birthday Night!\nCaesar Salad\nmushroom barl...	76	Female	60640	
7983	307782	7/10/2022	Yes	Bagel Brunch	NaN	NaN	Bagels with cream cheese\npancakes with svrup...	38	Male	60640	

208 rows x 20 columns

- Statistics

```
meals2['Age'].mean()
```

np.float64(62.65865384615385)

```
meals2['Monthly Income'].median()
```

794.0

- Group By: Split, Apply, Combine

```
meals.groupby('Disability').nunique()
```

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Age	Gender	Zip	Total number in household
Disability											
No	82	183	2	6	1	6	192	41	2	10	7
Yes	126	183	2	6	1	6	190	40	4	13	4

```
meals.groupby('Disability').nunique()['Client Name']
```

Disability	Client Name
No	82
Yes	126

dtype: int64

```
meals.groupby('SNAP').nunique()
```

	Client Name	Meal Date	To-Go Meal?	Meal Type	Theme Night	Sponsored Meal	Notes	Age	Gender	Zip	Disability	Total number in household
SNAP												
No	63	183	2	6	1	6	192	34	3	6	2	5
Yes	145	183	2	6	1	6	190	47	3	15	2	7

```
meals.groupby('SNAP').nunique()['Client Name']
```

SNAP	Client Name
No	63
Yes	145

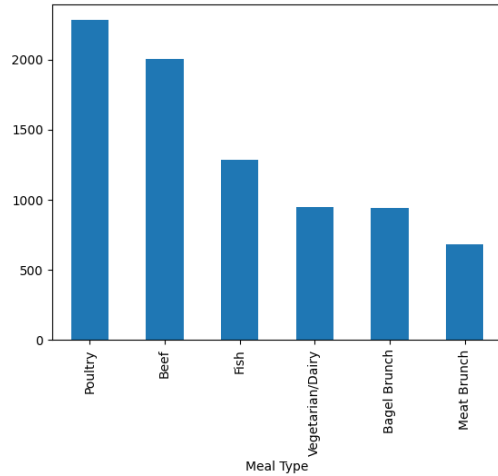
dtype: int64

## 5. Data Visualization

### Simple bar chart

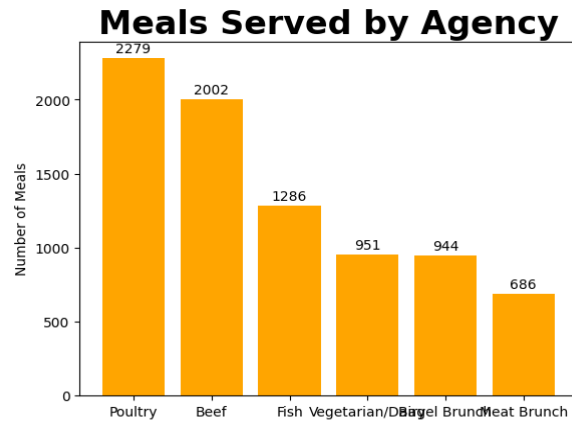
```
meals['Meal Type'].value_counts().plot(kind='bar')
```

<Axes: xlabel='Meal Type'>



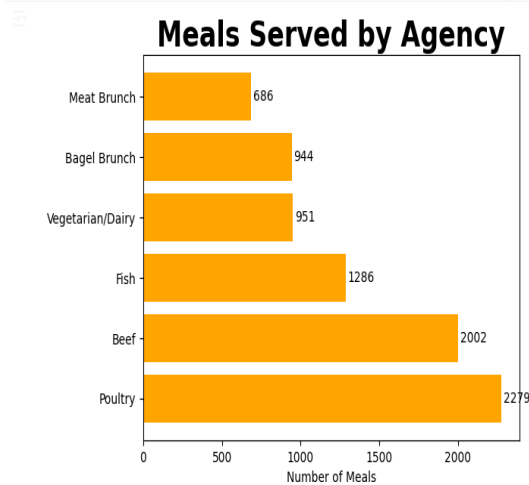
### Matplotlib bar chart

```
x= ['Poultry', 'Beef', 'Fish', 'Vegetarian/Dairy', 'Bagel Brunch', 'Meat Brunch']
y= [2279, 2002, 1286, 951, 944, 686]
p= plt.bar(x, y, color= 'orange')
plt.title('Meals Served by Agency', fontsize= 24, fontweight= 'bold')
plt.ylabel('Number of Meals', fontsize= 10)
plt.bar_label(p, padding= 2)
plt.show()
```



### Matplotlib horizontal bar chart

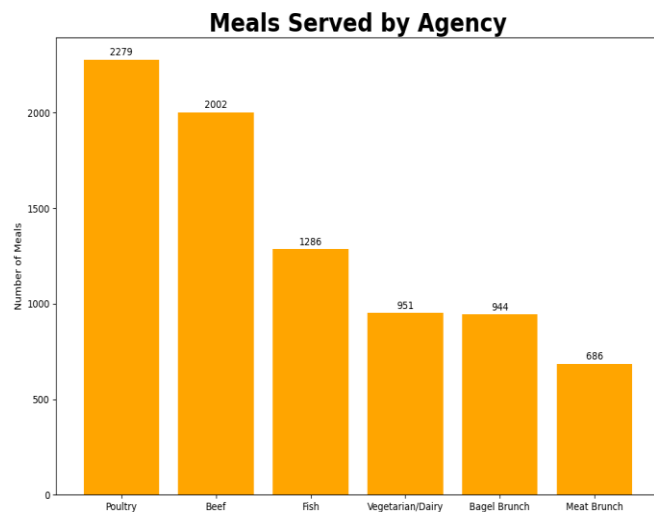
```
x= ['Poultry', 'Beef', 'Fish', 'Vegetarian/Dairy', 'Bagel Brunch', 'Meat Brunch']
y= [2279, 2002, 1286, 951, 944, 686]
p= plt.barh(x, y, color= 'orange')
plt.title('Meals Served by Agency', fontsize= 24, fontweight= 'bold')
plt.xlabel('Number of Meals', fontsize= 10)
plt.bar_label(p, padding= 2)
plt.show()
```



### Matplotlib bar chart using subplots

```
fig, ax= plt.subplots(figsize= (12, 8))
```

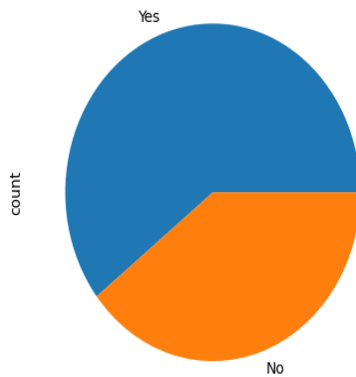
```
x= ['Poultry', 'Beef', 'Fish', 'Vegetarian/Dairy', 'Bagel Brunch', 'Meat Brunch']
y= [2279, 2002, 1286, 951, 944, 686]
p= ax.bar(x, y, color= 'orange')
ax.set_title('Meals Served by Agency', fontsize= 24, fontweight= 'bold')
ax.set_ylabel('Number of Meals', fontsize= 10)
ax.bar_label(p, padding= 2)
plt.show()
```



## Simple pie chart

```
meals2['Disability'].value_counts().plot(kind='pie')
```

<Axes: ylabel='count'>



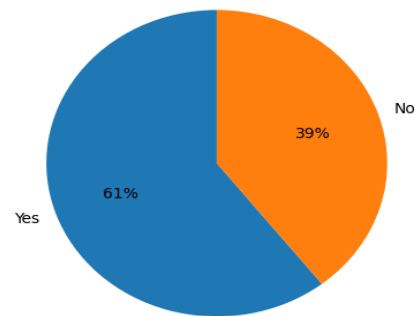
## Matplotlib pie chart

```
slices= [126, 82]  
labels= ['Yes', 'No']  
plt.pie(slices, labels= labels, autopct= '%.f%%', startangle= 90)  
plt.title('Does Client have a Disability?', fontsize= 20, fontweight= 'bold')
```

plt.show()



### Does Client have a Disability?



```
slices= [126, 82]  
labels= ['Yes', 'No']  
colors= ['yellow', 'purple']  
explode= [.2, 0]  
plt.pie(slices, labels= labels, autopct= '%.f%%', startangle= 90, wedgeprops= {'edgecolor': 'black'},  
        colors= colors, explode= explode)  
plt.title('Does Client have a Disability?', fontsize= 20, fontweight= 'bold')
```

plt.show()



### Does Client have a Disability?

