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Lab : 4

```
                        Pandas Grouping and Aggregation
```

IMPORT NECESSARY MODULES

In [1]:
```
import pandas as pd
df=pd.read_csv("thanksgiving-2015-poll-data.csv",encoding='Latin-1')
```

In [2]:
```
df.head()
```

Out[2]:

espondentID	Do you celebrate Thanksgiving?	What is typically the main dish at your Thanksgiving dinner?	What is typically the main dish at your Thanksgiving dinner? - Other (please specify)	How is the main dish typically cooked?	How is the main dish typically cooked? - Other (please specify)	What kind of stuffing/dressing do you typically have?	What kind of stuffing/dressing do you typically have? - Other (please specify)	What type of cranberry saucedo you typically have?	What type of cranberry saucedo you typically have? - Other (please specify)	...	Have you ever tried to meet up with hometown friends on Thanksgiving night?	"F
4337954960	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	None	NaN	...	Yes	
4337951949	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	Other (please specify)	Homemade cranberry gelatin ring	...	No	
4337935621	Yes	Turkey	NaN	Roasted	NaN	Rice-based	NaN	Homemade	NaN	...	Yes	
4337933040	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	Homemade	NaN	...	Yes	
4337931983	Yes	Tofurkey	NaN	Baked	NaN	Bread-based	NaN	Canned	NaN	...	Yes	

s × 65 columns

In [3]:
```
df.head(5)
```

Out[3]:

uffing/dressing o you typically have? - Other)lease specify)	What type of cranberry saucedo you typically have?	What type of cranberry saucedo you typically have? - Other (please specify)	...	Have you ever tried to meet up with hometown friends on Thanksgiving night?	Have you ever attended a "Friendsgiving?"	Will you shop any Black Friday sales on Thanksgiving Day?	Do you work in retail?	Will you employer make you work on Black Friday?	How would you describe where you live?	Age	What is your gender?	How much total combined money did all members of your HOUSEHOLD earn last year?	US Region
NaN	None	NaN	...	Yes	No	No	No	NaN	Suburban	18 - 29	Male	$75,000to$ 99,999	Middle Atlantic
NaN	Other (please specify)	Homemade cranberry gelatin ring	...	No	No	Yes	No	NaN	Rural	18 - 29	Female	$50,000to$ 74,999	East South Central
NaN	Homemade	NaN	...	Yes	Yes	Yes	No	NaN	Suburban	18 - 29	Male	$0to9,999$	Mountain
NaN	Homemade	NaN	...	Yes	No	No	No	NaN	Urban	30 - 44	Male	$200,000 and up	Pacific
NaN	Canned	NaN	...	Yes	No	No	No	NaN	Urban	30 - 44	Male	$100,000to$ 124,999	Pacific

In [4]:
```
df.shape
```

Out[4]:
```
(1058, 65)
```

WHAT ARE UNIQUE VALUES OF"DO YOU THANKSGIVING?"COLUMNS

In [5]:

```
df['Do you celebrate Thanksgiving?'].unique()
```

Out[5]:

```
array(['Yes', 'No'], dtype=object)
```

VIEW ALL COLUMN NAMES(TOP 5)

In [6]:

```
df.columns[1:5]
```

Out[6]:

```
Index(['Do you celebrate Thanksgiving?',
       'What is typically the main dish at your Thanksgiving dinner?',
       'What is typically the main dish at your Thanksgiving dinner? - Other (please specify)',
       'How is the main dish typically cooked?'],
      dtype='object')
```

Apply function to Series

How many male,female and NaN in "What is your gender?" columns

In [7]:

```
df["What is your gender?"].value_counts(dropna=False)
```

Out[7]:

```
Female    544
Male      481
NaN        33
Name: What is your gender?, dtype: int64
```

In [8]:

```
import math
def gender_code(gender_string):
    if isinstance(gender_string,float)and math.isnan(gender_string):
        return gender_string
    return int(gender_string=="Female")
```

Apply gender_code()to What is your gender? column

In [9]:

```
df["gender"]=df["What is your gender?"].apply(gender_code)
df["gender"].value_counts(dropna=False)

```

Out[9]:

```
1.0    544
0.0    481
NaN     33
Name: gender, dtype: int64
```

Applying function to DataFrames

check the data type of each column in data using a lambda function.just visualize data types of first 5 columns

In [10]:

```
df.apply(lambda x:x.dtype)[0:5]
```

Out[10]:

```
RespondentID                                                                              int64
Do you celebrate Thanksgiving?                                                           object
What is typically the main dish at your Thanksgiving dinner?                             object
What is typically the main dish at your Thanksgiving dinner? - Other (please specify)    object
How is the main dish typically cooked?                                                   object
dtype: object
```

DATA CLEANNING - Let us clean up income column

In [11]:

```
df["How much total combined money did all members of your HOUSEHOLD earn last year?"].value_counts(dropna=False)
```

Out[11]:

```
$25,000 to $49,999      180
Prefer not to answer    136
$50,000 to $74,999      135
$75,000 to $99,999      133
$100,000 to $124,999    111
$200,000 and up          80
$10,000 to $24,999       68
$0 to $9,999             66
$125,000 to $149,999     49
$150,000 to $174,999     40
NaN                      33
$175,000 to $199,999     27
Name: How much total combined money did all members of your HOUSEHOLD earn last year?, dtype: int64
```

In [23]:

```
import numpy as np
def clean_income(value):
    if value == "$200,000 and up":
        return 200000
    elif value == "Prefer not to answer":
        return np.nan
    elif isinstance(value , float)and math.isnan(value):
        return np.nan
    value = value.replace("$", "").replace(",","")

    income_high, income_low = value.split(" to ")
    return (int(income_high) + int(income_low)) / 2
```

Now apply this fuction to the "How much total combined money did all member of your HOUSRHOLD earn last year?" columns and put it in new column "income"

In [24]:

```
df["income"] = df["How much total combined money did all members of your HOUSEHOLD earn last year?"].apply(clean_income)
df["income"].head()
```

Out[24]:

```
0     87499.5
1     62499.5
2      4999.5
3    200000.0
4    112499.5
Name: income, dtype: float64
```

Grouping Data with Pandas

In [25]:

```
df["What type of cranberry saucedo you typically have?"].value_counts()
```

Out[25]:

```
Canned                    502
Homemade                  301
None                      146
Other (please specify)     25
Name: What type of cranberry saucedo you typically have?, dtype: int64
```

In [28]:

```
homemade = df[df["What type of cranberry saucedo you typically have?"] == "Homemade"]
canned = df[df["What type of cranberry saucedo you typically have?"] == "Canned"]
```

In [29]:

```
print(homemade["income"].mean())
print(canned["income"].mean())
```

```
94878.1072874494
83823.40340909091
```

In [30]:

```
grouped = df.groupby("What type of cranberry saucedo you typically have?")
grouped
```

Out[30]:

```
<pandas.core.groupby.generic.DataFrameGroupBy object at 0x0000018721AF4610>
```

In [31]:

```
dict(grouped.groups)
```

Out[31]:

```
{'Canned': Int64Index([   4,    6,    8,   11,   12,   15,   18,   19,   26,   27,
             ...
             1040, 1041, 1042, 1044, 1045, 1046, 1047, 1051, 1054, 1057],
            dtype='int64', length=502),
 'Homemade': Int64Index([   2,    3,    5,    7,   13,   14,   16,   20,   21,   23,
             ...
             1016, 1017, 1025, 1027, 1030, 1034, 1048, 1049, 1053, 1056],
            dtype='int64', length=301),
 'None': Int64Index([   0,   17,   24,   29,   34,   36,   40,   47,   49,   51,
             ...
              980,  981,  997, 1015, 1018, 1031, 1037, 1043, 1050, 1055],
            dtype='int64', length=146),
 'Other (please specify)': Int64Index([   1,    9,  154,  216,  221,  233,  249,  265,  301,  336,  380,
              435,  444,  447,  513,  550,  749,  750,  784,  807,  860,  872,
              905, 1000, 1007],
            dtype='int64')}
```

In [32]:

```
grouped.size()
```

Out[32]:

```
What type of cranberry saucedo you typically have?
Canned                    502
Homemade                  301
None                      146
Other (please specify)     25
dtype: int64
```

In [34]:

```
for name,group in grouped:
    print(name)
    print(group.shape)
    print(type(group))
```

```
Canned
(502, 67)
<class 'pandas.core.frame.DataFrame'>
Homemade
(301, 67)
<class 'pandas.core.frame.DataFrame'>
None
(146, 67)
<class 'pandas.core.frame.DataFrame'>
Other (please specify)
(25, 67)
<class 'pandas.core.frame.DataFrame'>
```

In [35]:

```
grouped["income"]
```

Out[35]:

```
<pandas.core.groupby.generic.SeriesGroupBy object at 0x0000018721B183D0>
```

In [36]:

```
grouped["income"].size()
```

Out[36]:

```
What type of cranberry saucedo you typically have?
Canned                    502
Homemade                  301
None                      146
Other (please specify)     25
Name: income, dtype: int64
```

Aggregating values in groups

In [37]:

```
grouped["income"].agg(np.mean)
```

Out[37]:

```
What type of cranberry saucedo you typically have?
Canned                    83823.403409
Homemade                  94878.107287
None                      78886.084034
Other (please specify)    86629.978261
Name: income, dtype: float64
```

In [38]:

```
grouped.agg(np.mean)
```

Out[38]:

	RespondentID	gender	income
What type of cranberry saucedo you typically have?			
Canned	4.336699e+09	0.552846	83823.403409
Homemade	4.336792e+09	0.533101	94878.107287
None	4.336765e+09	0.517483	78886.084034
Other (please specify)	4.336763e+09	0.640000	86629.978261

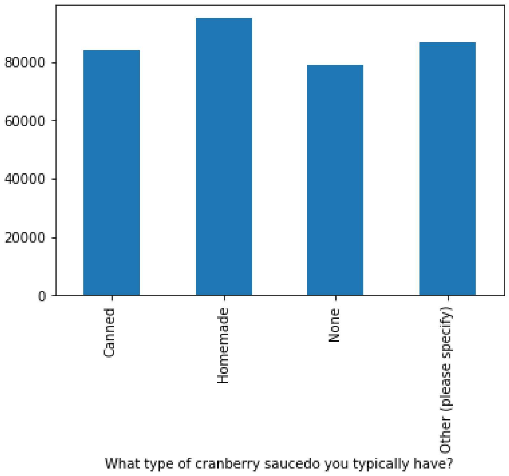
Plotting the results of aggregation

In [39]:

```
sauce = grouped.agg(np.mean)
sauce["income"].plot(kind="bar")
```

Out[39]:

```
<AxesSubplot:xlabel='What type of cranberry saucedo you typically have?'>
```



Aggregation with multiple columns

In [45]:

```
grouped = df.groupby(["What type of cranberry saucedo you typically have?" ,"What type of cranberry saucedo you typically
grouped.agg(np.mean)
```

Out[45]:

		RespondentID	gender	income
What type of cranberry saucedo you typically have?	**What type of cranberry saucedo you typically have?**			
Canned	**Canned**	4.336699e+09	0.552846	83823.403409
Homemade	**Homemade**	4.336792e+09	0.533101	94878.107287
None	**None**	4.336765e+09	0.517483	78886.084034
Other (please specify)	**Other (please specify)**	4.336763e+09	0.640000	86629.978261

Aggregating with multiple functions

In [49]:

```
grouped=df.groupby("How would you describe where you live?")["What is typically the main dish at your Thanksgiving dinner
grouped.apply(lambda x:x.value_counts())
```

Out[49]:

```
How would you describe where you live?
Rural                                   Turkey                    189
                                        Other (please specify)      9
                                        Ham/Pork                    7
                                        Tofurkey                    3
                                        I don't know                3
                                        Turducken                   2
                                        Chicken                     2
                                        Roast beef                  1
Suburban                                Turkey                    449
                                        Ham/Pork                   17
                                        Other (please specify)     13
                                        Tofurkey                    9
                                        Chicken                     3
                                        Roast beef                  3
                                        Turducken                   1
                                        I don't know                1
Urban                                   Turkey                    198
                                        Other (please specify)     13
```

In [ ]: