Consider the following Python dictionary data and Python list labels:

data = {'birds': ['Cranes', 'Cranes', 'plovers', 'spoonbills', 'spoonbills', 'Cranes', 'plovers', 'Cranes', 'spoonbills', 'spoonbills'], 'age': [3.5, 4, 1.5, np.nan, 6, 3, 5.5, np.nan, 8, 4], 'visits': [2, 4, 3, 4, 3, 4, 2, 2, 3, 2], 'priority': ['yes', 'yes', 'no', 'yes', 'no', 'no', 'no', 'yes', 'no', 'no']}

labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

1. Create a DataFrame birds from this dictionary data which has the index labels.

In [1]:
```
import numpy as np
import pandas as pd
```

In [6]:
```
data = {'birds': ['Cranes', 'Cranes', 'plovers', 'spoonbills', 'spoonbills', 'Cranes', 'plovers', 'Cranes', 'sp
        'age': [3.5, 4, 1.5, np.nan, 6, 3, 5.5, np.nan, 8, 4], 'visits': [2, 4, 3, 4, 3, 4, 2, 2, 3, 2],
        'priority': ['yes', 'yes', 'no', 'yes', 'no', 'no', 'no', 'yes', 'no', 'no']}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

birds_df = pd.DataFrame(data, index = labels)
birds_df
```

Out[6]:

	birds	age	visits	priority
a	Cranes	3.5	2	yes
b	Cranes	4.0	4	yes
c	plovers	1.5	3	no
d	spoonbills	NaN	4	yes
e	spoonbills	6.0	3	no
f	Cranes	3.0	4	no
g	plovers	5.5	2	no
h	Cranes	NaN	2	yes
i	spoonbills	8.0	3	no
j	spoonbills	4.0	2	no

2. Display a summary of the basic information about birds DataFrame and its data.

In [4]:
```
birds_df.describe()
```

Out[4]:

	age	visits
count	8.000000	10.000000
mean	4.437500	2.900000
std	2.007797	0.875595
min	1.500000	2.000000
25%	3.375000	2.000000
50%	4.000000	3.000000
75%	5.625000	3.750000
max	8.000000	4.000000

3. Print the first 2 rows of the birds dataframe

In [5]:
```
top_two = birds_df[:2]
top_two
```

Out[5]:

	birds	age	visits	priority
a	Cranes	3.5	2	yes
b	Cranes	4.0	4	yes

4. Print all the rows with only 'birds' and 'age' columns from the dataframe

In [7]:
```
birds_df[['birds', 'age']]
```

Out[7]:

	birds	age
a	Cranes	3.5
b	Cranes	4.0
c	plovers	1.5
d	spoonbills	NaN
e	spoonbills	6.0
f	Cranes	3.0
g	plovers	5.5
h	Cranes	NaN
i	spoonbills	8.0
j	spoonbills	4.0

5. select [2, 3, 7] rows and in columns ['birds', 'age', 'visits']

In [8]:
```
birds_df[['birds', 'age', 'visits']].iloc[[2, 3, 7]]
```

Out[8]:

	birds	age	visits
c	plovers	1.5	3
d	spoonbills	NaN	4
h	Cranes	NaN	2

6. select the rows where the number of visits is less than 4

In [9]:
```
birds_df[birds_df['visits'] < 4]
```

Out[9]:

	birds	age	visits	priority
a	Cranes	3.5	2	yes
c	plovers	1.5	3	no
e	spoonbills	6.0	3	no
g	plovers	5.5	2	no
h	Cranes	NaN	2	yes
i	spoonbills	8.0	3	no
j	spoonbills	4.0	2	no

7. select the rows with columns ['birds', 'visits'] where the age is missing i.e NaN

In [12]:
```
age_miss_df = birds_df[birds_df['age'].isnull()]
age_miss_df[['birds', 'visits']]
```

Out[12]:

	birds	visits
d	spoonbills	4
h	Cranes	2

8. Select the rows where the birds is a Cranes and the age is less than 4

In [13]:
```
birds_df[(birds_df['birds'] == 'Cranes') & (birds_df['age'] < 4)]
```

Out[13]:

	birds	age	visits	priority
a	Cranes	3.5	2	yes
f	Cranes	3.0	4	no

9. Select the rows the age is between 2 and 4(inclusive)

In [14]:
```
birds_df[birds_df['age'].between(2,4)]
```

Out[14]:

	birds	age	visits	priority
a	Cranes	3.5	2	yes
b	Cranes	4.0	4	yes
f	Cranes	3.0	4	no
j	spoonbills	4.0	2	no

10. Find the total number of visits of the bird Cranes

In [15]:
```
birds_df[(birds_df['birds'] == 'Cranes') & (birds_df['visits'] > 0)].sum()
```

Out[15]:
```
birds       CranesCranesCranesCranes
age                             10.5
visits                            12
priority                yesyesnoyes
dtype: object
```

11. Calculate the mean age for each different birds in dataframe.

In [16]:
```
birds_df.groupby('birds', as_index = False)['age'].mean()
```

Out[16]:

	birds	age
0	Cranes	3.5
1	plovers	3.5
2	spoonbills	6.0

12. Append a new row 'k' to dataframe with your choice of values for each column. Then delete that row to return the original DataFrame.

In [23]:
```
birds_df.loc['k'] = ['sparrow', 1, 2, 'yes']
print(f"After appending Kth row\n:{birds_df}")
birds_df = birds_df.drop('k')
print(f"\n\nAfter droping Kth row\n:{birds_df}")
```

```
After appending Kth row
:        birds  age  visits priority
a      Cranes  3.5       2      yes
b      Cranes  4.0       4      yes
c     plovers  1.5       3       no
d  spoonbills  NaN       4      yes
e  spoonbills  6.0       3       no
f      Cranes  3.0       4       no
g     plovers  5.5       2       no
h      Cranes  NaN       2      yes
i  spoonbills  8.0       3       no
j  spoonbills  4.0       2       no
k     sparrow  1.0       2      yes


After droping Kth row
:        birds  age  visits priority
a      Cranes  3.5       2      yes
b      Cranes  4.0       4      yes
c     plovers  1.5       3       no
d  spoonbills  NaN       4      yes
e  spoonbills  6.0       3       no
f      Cranes  3.0       4       no
g     plovers  5.5       2       no
h      Cranes  NaN       2      yes
i  spoonbills  8.0       3       no
j  spoonbills  4.0       2       no
```

13. Find the number of each type of birds in dataframe (Counts)

In [24]:
```
birds_df['birds'].value_counts()
```

Out[24]:
```
Cranes        4
spoonbills    4
plovers       2
Name: birds, dtype: int64
```

14. Sort dataframe (birds) first by the values in the 'age' in decending order, then by the value in the 'visits' column in ascending order.

In [25]:
```
sorted_birds_df = birds_df.sort_values(['age', 'visits'], ascending = [False, True], axis = 0)
sorted_birds_df
```

Out[25]:

	birds	age	visits	priority
i	spoonbills	8.0	3	no
e	spoonbills	6.0	3	no
g	plovers	5.5	2	no
j	spoonbills	4.0	2	no
b	Cranes	4.0	4	yes
a	Cranes	3.5	2	yes
f	Cranes	3.0	4	no
c	plovers	1.5	3	no
h	Cranes	NaN	2	yes
d	spoonbills	NaN	4	yes

15. Replace the priority column values with'yes' should be 1 and 'no' should be 0

In [26]:
```
birds_df.replace(to_replace = ['yes', 'no'], value = [1, 0])
```

Out[26]:

	birds	age	visits	priority
a	Cranes	3.5	2	1
b	Cranes	4.0	4	1
c	plovers	1.5	3	0
d	spoonbills	NaN	4	1
e	spoonbills	6.0	3	0
f	Cranes	3.0	4	0
g	plovers	5.5	2	0
h	Cranes	NaN	2	1
i	spoonbills	8.0	3	0
j	spoonbills	4.0	2	0

16. In the 'birds' column, change the 'Cranes' entries to 'trumpeters'.

In [27]:
```
birds_df.loc[birds_df.birds == 'Cranes', 'birds'] = 'trumpeters'
birds_df
```

Out[27]:

	birds	age	visits	priority
a	trumpeters	3.5	2	yes
b	trumpeters	4.0	4	yes
c	plovers	1.5	3	no
d	spoonbills	NaN	4	yes
e	spoonbills	6.0	3	no
f	trumpeters	3.0	4	no
g	plovers	5.5	2	no
h	trumpeters	NaN	2	yes
i	spoonbills	8.0	3	no
j	spoonbills	4.0	2	no

In [ ]: