Tutorial Week 3: Pandas for Tabular Data (Solutions)

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Example: Load the automobile dataset and print the first 5 rows

Hint:

- The data are available in the files automobile_data.csv.
- Use Pandas `read_csv()` to load the automobile dataset.
- Use Pandas `head()` to return the first `n` rows.

```
[1]: import pandas as pd

     ### Start your code here ###

     df = pd.read_csv("automobile_data.csv")
     df.head(5)

     ### End your code here ###
```

```
[1]:    index      company   body-style  wheel-base  length engine-type  \
     0      0  alfa-romero  convertible        88.6   168.8        dohc
     1      1  alfa-romero  convertible        88.6   168.8        dohc
     2      2  alfa-romero    hatchback        94.5   171.2        ohcv
     3      3         audi        sedan        99.8   176.6         ohc
     4      4         audi        sedan        99.4   176.6         ohc

       num-of-cylinders  horsepower  average-mileage  price
     0             four         111               21  13495
     1             four         111               21  16500
     2              six         154               19  16500
     3             four         102               24  13950
     4             five         115               18  17450
```

1 Questions

Hint:

- The data are available in the files automobile_data.csv.
- Write **your code** between two comment lines: `### Start/End your code here ###`.
- **Expected output** is shown at the end of each question (directly below the code cell).

1.1 Drop the rows where at least one element is missing

Hint:

- Use Pandas `dropna()`.

```
[2]: import pandas as pd
     import numpy as np

     # dictionary with list object in values
     details = {
         'Name' : ['Ankit', 'Aishwarya', 'Shaurya', 'Shivangi'],
         'Age' : [23, np.nan, 22, 21],
         'University' : ['BHU', 'JNU', np.nan, 'BHU'],
     }

     # creating a Dataframe object
     df = pd.DataFrame(details)

     ### Start your code here ###

     df1 = df.dropna()
     df1

     ### End your code here ###
```

```
[2]:        Name   Age University
     0     Ankit  23.0        BHU
     3  Shivangi  21.0        BHU
```

1.2   Print all details of Toyota cars

Hint:

- Use Pandas selection method.

```
[3]: import pandas as pd

     df = pd.read_csv("automobile_data.csv")

     ### Start your code here ###

     df1 = df.loc[df['company']=='toyota']
     df1

     ### End your code here ###
```

```
[3]:     index company body-style  wheel-base  length engine-type num-of-cylinders␣
     ↪ \
     44     66  toyota  hatchback        95.7   158.7         ohc             four
     45     67  toyota  hatchback        95.7   158.7         ohc             four
     46     68  toyota  hatchback        95.7   158.7         ohc             four
     47     69  toyota      wagon        95.7   169.7         ohc             four
     48     70  toyota      wagon        95.7   169.7         ohc             four
     49     71  toyota      wagon        95.7   169.7         ohc             four
     50     79  toyota      wagon       104.5   187.8        dohc              six
```

```
    horsepower  average-mileage  price
44          62               35   5348
45          62               31   6338
46          62               31   6488
47          62               31   6918
48          62               27   7898
49          62               27   8778
50         156               19  15750
```

1.3   Find the most expensive car's company name

- Print most expensive car's company name and price.

```python
[4]: import pandas as pd

     df = pd.read_csv("automobile_data.csv")

     ### Start your code here ###

     df1 = df.loc[df['price']==df['price'].max()]
     df2 = df1[['company','price']]
     df2

     ### End your code here ###
```

```
[4]:          company  price
     32  mercedes-benz  45400
```

1.4   Count total cars per company

Hint:

- Use Pandas `value_counts()`.

```python
[5]: import pandas as pd

     df = pd.read_csv("automobile_data.csv")

     ### Start your code here ###

     df1 = df['company'].value_counts()
     df1

     ### End your code here ###
```

```
[5]: toyota          7
     bmw             6
     mazda           5
     nissan          5
     audi            4
     mercedes-benz   4
```

```
mitsubishi     4
volkswagen     4
alfa-romero    3
honda          3
jaguar         3
chevrolet      2
dodge          2
porsche        2
volvo          2
isuzu          1
Name: company, dtype: int64
```

1.5 Find each company's Higesht price car

```
[6]: import pandas as pd

     df = pd.read_csv("automobile_data.csv")

     ### Start your code here ###

     df1 = df.groupby('company')['price'].max()
     df1

     ### End your code here ###
```

```
[6]: company
     alfa-romero     16500
     audi            18920
     bmw             41315
     chevrolet        6575
     dodge            6377
     honda           12945
     isuzu            6785
     jaguar          36000
     mazda           18344
     mercedes-benz   45400
     mitsubishi       8189
     nissan          13499
     porsche         37028
     toyota          15750
     volkswagen       9995
     volvo           13415
     Name: price, dtype: int64
```

1.6 Find the average mileage of each car making company

```
[7]: import pandas as pd

     df = pd.read_csv("automobile_data.csv")

     ### Start your code here ###
```

```
df1 = df.groupby('company')['average-mileage'].mean()
df1

### End your code here ###
```

[7]:
```
company
alfa-romero      20.333333
audi             20.000000
bmw              19.000000
chevrolet        38.000000
dodge            31.000000
honda            26.333333
isuzu            24.000000
jaguar           14.333333
mazda            28.000000
mercedes-benz    18.000000
mitsubishi       29.500000
nissan           31.400000
porsche          17.000000
toyota           28.714286
volkswagen       31.750000
volvo            23.000000
Name: average-mileage, dtype: float64
```

1.7   Sort all cars by Price column in descending order

Hint:

- Use Pandas `sort_values()`.
- Print the first 5 rows of the sorted `Dataframe`.

[8]:
```
import pandas as pd

df = pd.read_csv("automobile_data.csv")

### Start your code here ###

df1 = df.sort_values(by=['price'], ascending=False)
df1.head(5)

### End your code here ###
```

[8]:
	index	company	body-style	wheel-base	length	engine-type	\
32	47	mercedes-benz	hardtop	112.0	199.2	ohcv	
11	14	bmw	sedan	103.5	193.8	ohc	
31	46	mercedes-benz	sedan	120.9	208.1	ohcv	
43	62	porsche	convertible	89.5	168.9	ohcf	
12	15	bmw	sedan	110.0	197.0	ohc	

	num-of-cylinders	horsepower	average-mileage	price
32	eight	184	14	45400

```
11            six        182           16  41315
31          eight        184           14  40960
43            six        207           17  37028
12            six        182           15  36880
```

1.8 Concatenate two Dataframes and reset the index of the combined Dataframe

Hint:

- Use Pandas `concat()` and its `ignore_index` option.

```python
[9]: import pandas as pd

df1 = pd.DataFrame({'Company': ['Ford', 'Mercedes', 'BMV', 'Audi'], 'Price':
 ↪[23845, 171995, 135925 , 71400]})

df2 = pd.DataFrame({'Company': ['Toyota', 'Honda', 'Nissan', 'Mitsubishi '],
 ↪'Price': [29995, 23600, 61500 , 58900]})

### Start your code here ###

df3 = pd.concat([df1, df2], ignore_index=True)
df3

### End your code here ###
```

```
[9]:        Company    Price
     0         Ford    23845
     1     Mercedes   171995
     2          BMV   135925
     3         Audi    71400
     4       Toyota    29995
     5        Honda    23600
     6       Nissan    61500
     7   Mitsubishi    58900
```

1.9 Merge two data frames using the following condition

- Create two `DataFrame`s using the following two `Dictionary`s.
- Merge two `DataFrame`s on the `Company` column.

```python
[10]: import pandas as pd

dict1 = {'Company': ['Toyota', 'Honda', 'BMV', 'Audi', 'Jaguar'], 'Price':
 ↪[23845, 17995, 135925 , 71400, 23725]}
df1 = pd.DataFrame(dict1)

dict2 = {'Company': ['Toyota', 'Honda', 'BMV', 'Audi', 'Jaguar'],
 ↪'horsepower': [141, 80, 182 , 160, 220]}
df2 = pd.DataFrame(dict2)
```

```
### Start your code here ###

df3 = pd.merge(df1, df2, on="Company")
df3

### End your code here ###
```

```
[10]:    Company    Price   horsepower
      0   Toyota    23845          141
      1    Honda    17995           80
      2      BMV   135925          182
      3     Audi    71400          160
      4   Jaguar    23725          220
```