


```
import pandas as pd
```

```
q = pd.read_csv("/content/PQ Exercise 1d.csv")
```

q



	Metric	Store	Cat	01/01/2017	02/01/2017	03/01/2017	Q1 2017	04/01/2017	05/01/2017	06/01/2017	...	Q2 2018	07/01/2018
0	Sales	1	1	NaN	NaN	NaN	NaN	19403.5400	21827.9000	21043.3900	...	62274.8300	22136.6400
1	NaN	1	2	50605.2700	44682.7400	47928.8900	143216.9000	44292.8700	48397.9800	43751.9400	...	136442.7900	43615.4900
2	NaN	1	3	13740.1200	10887.8400	11523.4700	36151.4300	11135.1700	12275.5800	10123.4500	...	33534.2000	9001.3700
3	NaN	1	4	39954.0400	35351.2100	36826.9500	112132.2000	34660.1600	38086.1900	32668.6700	...	105415.0200	34118.1100
4	NaN	2	1	35034.0600	60483.7000	58221.5200	153739.2800	25962.3200	27372.0500	28660.8700	...	81995.2400	28446.9200
5	NaN	2	2	74661.1600	65487.4600	70853.5800	211002.2000	64963.9000	68428.6400	66622.0300	...	200014.5700	64307.0100
6	NaN	2	3	16873.2000	13821.0100	14607.2800	45301.4900	15635.9500	14895.9600	13061.5600	...	43593.4700	10394.2800
7	NaN	2	4	47681.9600	44197.9500	46131.1400	138011.0500	42126.7100	46937.8100	42489.2100	...	131553.7300	44622.5600
8	Margin	1	1	NaN	NaN	NaN	NaN	0.5432	0.5432	0.5432	...	0.5432	0.5432
9	NaN	1	2	0.5542	0.5542	0.5542	0.5542	0.5542	0.5542	0.5542	...	0.5542	0.5542
10	NaN	1	3	0.5212	0.5212	0.5212	0.5212	0.5212	0.5212	0.5212	...	0.5212	0.5212
11	NaN	1	4	0.5462	0.5462	0.5462	0.5462	0.5462	0.5462	0.5462	...	0.5462	0.5462
12	NaN	2	1	0.5432	0.5432	0.5432	0.5432	0.5432	0.5432	0.5432	...	0.5432	0.5432
13	NaN	2	2	0.5542	0.5542	0.5542	0.5542	0.5542	0.5542	0.5542	...	0.5542	0.5542
14	NaN	2	3	0.5212	0.5212	0.5212	0.5212	0.5212	0.5212	0.5212	...	0.5212	0.5212
15	NaN	2	4	0.5462	0.5462	0.5462	0.5462	0.5462	0.5462	0.5462	...	0.5462	0.5462

16 rows × 37 columns

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```
q = q.melt(id_vars=["Metric", "Store", "Cat"], var_name = 'Date', value_name = "Sales")
q.head()
```



	Metric	Store	Cat	Date	Sales
0	Sales	1	1	01/01/2017	NaN
1	NaN	1	2	01/01/2017	50605.27
2	NaN	1	3	01/01/2017	13740.12
3	NaN	1	4	01/01/2017	39954.04
4	NaN	2	1	01/01/2017	35034.06


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```
print (q.to_string())
```



	Metric	Store	Cat	Date	Sales
0	Sales	1	1	01/01/2017	NaN
1	NaN	1	2	01/01/2017	50605.2700
2	NaN	1	3	01/01/2017	13740.1200
3	NaN	1	4	01/01/2017	39954.0400
4	NaN	2	1	01/01/2017	35034.0600
5	NaN	2	2	01/01/2017	74661.1600
6	NaN	2	3	01/01/2017	16873.2000
7	NaN	2	4	01/01/2017	47681.9600
8	Margin	1	1	01/01/2017	NaN
9	NaN	1	2	01/01/2017	0.5542
10	NaN	1	3	01/01/2017	0.5212
11	NaN	1	4	01/01/2017	0.5462
12	NaN	2	1	01/01/2017	0.5432
13	NaN	2	2	01/01/2017	0.5542
14	NaN	2	3	01/01/2017	0.5212

15	NaN	2	4	01/01/2017	0.5462
16	Sales	1	1	02/01/2017	NaN
17	NaN	1	2	02/01/2017	44682.7400
18	NaN	1	3	02/01/2017	10887.8400
19	NaN	1	4	02/01/2017	35351.2100
20	NaN	2	1	02/01/2017	60483.7000
21	NaN	2	2	02/01/2017	65487.4600
22	NaN	2	3	02/01/2017	13821.0100
23	NaN	2	4	02/01/2017	44197.9500
24	Margin	1	1	02/01/2017	NaN
25	NaN	1	2	02/01/2017	0.5542
26	NaN	1	3	02/01/2017	0.5212
27	NaN	1	4	02/01/2017	0.5462
28	NaN	2	1	02/01/2017	0.5432
29	NaN	2	2	02/01/2017	0.5542
30	NaN	2	3	02/01/2017	0.5212
31	NaN	2	4	02/01/2017	0.5462
32	Sales	1	1	03/01/2017	NaN
33	NaN	1	2	03/01/2017	47928.8900
34	NaN	1	3	03/01/2017	11523.4700
35	NaN	1	4	03/01/2017	36826.9500
36	NaN	2	1	03/01/2017	58221.5200
37	NaN	2	2	03/01/2017	70853.5800
38	NaN	2	3	03/01/2017	14607.2800
39	NaN	2	4	03/01/2017	46131.1400
40	Margin	1	1	03/01/2017	NaN
41	NaN	1	2	03/01/2017	0.5542
42	NaN	1	3	03/01/2017	0.5212
43	NaN	1	4	03/01/2017	0.5462
44	NaN	2	1	03/01/2017	0.5432
45	NaN	2	2	03/01/2017	0.5542
46	NaN	2	3	03/01/2017	0.5212
47	NaN	2	4	03/01/2017	0.5462
48	Sales	1	1	Q1 2017	NaN
49	NaN	1	2	Q1 2017	143216.9000
50	NaN	1	3	Q1 2017	36151.4300
51	NaN	1	4	Q1 2017	112132.2000
52	NaN	2	1	Q1 2017	153739.2800
53	NaN	2	2	Q1 2017	211002.2000
54	NaN	2	3	Q1 2017	45301.4900
55	NaN	2	4	Q1 2017	138011.0500
56	Margin	1	1	Q1 2017	NaN

```
q.Metric = q.Metric.ffill()
```

```
print(q.to_string())
```

	Metric	Store	Cat	Date	Sales
0	Sales	1	1	01/01/2017	NaN
1	Sales	1	2	01/01/2017	50605.2700
2	Sales	1	3	01/01/2017	13740.1200
3	Sales	1	4	01/01/2017	39954.0400
4	Sales	2	1	01/01/2017	35034.0600
5	Sales	2	2	01/01/2017	74661.1600
6	Sales	2	3	01/01/2017	16873.2000
7	Sales	2	4	01/01/2017	47681.9600
8	Margin	1	1	01/01/2017	NaN
9	Margin	1	2	01/01/2017	0.5542
10	Margin	1	3	01/01/2017	0.5212
11	Margin	1	4	01/01/2017	0.5462
12	Margin	2	1	01/01/2017	0.5432
13	Margin	2	2	01/01/2017	0.5542
14	Margin	2	3	01/01/2017	0.5212
15	Margin	2	4	01/01/2017	0.5462
16	Sales	1	1	02/01/2017	NaN
17	Sales	1	2	02/01/2017	44682.7400
18	Sales	1	3	02/01/2017	10887.8400
19	Sales	1	4	02/01/2017	35351.2100
20	Sales	2	1	02/01/2017	60483.7000
21	Sales	2	2	02/01/2017	65487.4600
22	Sales	2	3	02/01/2017	13821.0100
23	Sales	2	4	02/01/2017	44197.9500
24	Margin	1	1	02/01/2017	NaN
25	Margin	1	2	02/01/2017	0.5542
26	Margin	1	3	02/01/2017	0.5212
27	Margin	1	4	02/01/2017	0.5462
28	Margin	2	1	02/01/2017	0.5432
29	Margin	2	2	02/01/2017	0.5542
30	Margin	2	3	02/01/2017	0.5212
31	Margin	2	4	02/01/2017	0.5462
32	Sales	1	1	03/01/2017	NaN
33	Sales	1	2	03/01/2017	47928.8900
34	Sales	1	3	03/01/2017	11523.4700

35	Sales	1	4	03/01/2017	36826.9500
36	Sales	2	1	03/01/2017	58221.5200
37	Sales	2	2	03/01/2017	70853.5800
38	Sales	2	3	03/01/2017	14607.2800
39	Sales	2	4	03/01/2017	46131.1400
40	Margin	1	1	03/01/2017	NaN
41	Margin	1	2	03/01/2017	0.5542
42	Margin	1	3	03/01/2017	0.5212
43	Margin	1	4	03/01/2017	0.5462
44	Margin	2	1	03/01/2017	0.5432
45	Margin	2	2	03/01/2017	0.5542
46	Margin	2	3	03/01/2017	0.5212
47	Margin	2	4	03/01/2017	0.5462
48	Sales	1	1	Q1 2017	NaN
49	Sales	1	2	Q1 2017	143216.9000
50	Sales	1	3	Q1 2017	36151.4300
51	Sales	1	4	Q1 2017	112132.2000
52	Sales	2	1	Q1 2017	153739.2800
53	Sales	2	2	Q1 2017	211002.2000
54	Sales	2	3	Q1 2017	45301.4900
55	Sales	2	4	Q1 2017	138011.0500
56	Margin	1	1	Q1 2017	NaN

```
q = q.pivot(index = [ "Store", "Cat", "Date"], columns = "Metric", values = "Sales")
```

```
q.columns.name = None
q.head()
```

			Margin	Sales
Store	Cat	Date		
1	1	01/01/2017	NaN	NaN
		01/01/2018	0.5432	24924.50
		02/01/2017	NaN	NaN
		02/01/2018	0.5432	46039.49
		03/01/2017	NaN	NaN

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```
q.reset_index(inplace = True)
```

	Store	Cat	Date	Margin	Sales
0	1	1	01/01/2017	NaN	NaN
1	1	1	01/01/2018	0.5432	24924.50
2	1	1	02/01/2017	NaN	NaN
3	1	1	02/01/2018	0.5432	46039.49
4	1	1	03/01/2017	NaN	NaN
...
267	2	4	Q2 2018	0.5462	131553.73
268	2	4	Q3 2017	0.5462	134029.66
269	2	4	Q3 2018	0.5462	134029.66
270	2	4	Q4 2017	0.5462	132448.20
271	2	4	Q4 2018	0.5462	132448.20

272 rows × 5 columns

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```
q.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 272 entries, 0 to 271
Data columns (total 5 columns):
```

```
#   Column  Non-Null Count  Dtype
---  -
0   Store    272 non-null    int64
1   Cat      272 non-null    int64
2   Date     272 non-null    object
3   Margin   268 non-null    float64
4   Sales    268 non-null    float64
dtypes: float64(2), int64(2), object(1)
memory usage: 10.8+ KB
```

```
q.Date = pd.to_datetime(q.Date, errors = 'coerce', format = 'mixed')
```

q



	Store	Cat	Date	Margin	Sales
0	1	1	2017-01-01	NaN	NaN
1	1	1	2018-01-01	0.5432	24924.50
2	1	1	2017-02-01	NaN	NaN
3	1	1	2018-02-01	0.5432	46039.49
4	1	1	2017-03-01	NaN	NaN
...
267	2	4	NaT	0.5462	131553.73
268	2	4	NaT	0.5462	134029.66
269	2	4	NaT	0.5462	134029.66
270	2	4	NaT	0.5462	132448.20
271	2	4	NaT	0.5462	132448.20

272 rows × 5 columns


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q.info()






```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 272 entries, 0 to 271
Data columns (total 5 columns):
#   Column  Non-Null Count  Dtype
---  -
0   Store    272 non-null    int64
1   Cat      272 non-null    int64
2   Date     208 non-null    datetime64[ns]
3   Margin   268 non-null    float64
4   Sales    268 non-null    float64
dtypes: datetime64[ns](1), float64(2), int64(2)
memory usage: 10.8 KB
```

```
q.dropna(inplace = True)
```

q



	Store	Cat	Date	Margin	Sales	
1	1	1	2018-01-01	0.5432	24924.50	
3	1	1	2018-02-01	0.5432	46039.49	
5	1	1	2018-03-01	0.5432	41595.55	
6	1	1	2017-04-01	0.5432	19403.54	
7	1	1	2018-04-01	0.5432	19403.54	
...	
259	2	4	2018-11-01	0.5462	43463.55	
260	2	4	2017-12-01	0.5462	43703.76	
261	2	4	2018-12-01	0.5462	43703.76	
262	2	4	2017-01-01	0.5462	536042.64	
263	2	4	2018-01-01	0.5462	536042.64	

205 rows × 5 columns

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```
q['Profit'] = q.Margin * q.Sales

q['COGS'] = (q.Sales - q.Profit).round(2)
```

q



	Store	Cat	Date	Margin	Sales	Profit	COGS	
1	1	1	2018-01-01	0.5432	24924.50	13538.988400	11385.51	
3	1	1	2018-02-01	0.5432	46039.49	25008.650968	21030.84	
5	1	1	2018-03-01	0.5432	41595.55	22594.702760	19000.85	
6	1	1	2017-04-01	0.5432	19403.54	10540.002928	8863.54	
7	1	1	2018-04-01	0.5432	19403.54	10540.002928	8863.54	
...	
259	2	4	2018-11-01	0.5462	43463.55	23739.791010	19723.76	
260	2	4	2017-12-01	0.5462	43703.76	23870.993712	19832.77	
261	2	4	2018-12-01	0.5462	43703.76	23870.993712	19832.77	
262	2	4	2017-01-01	0.5462	536042.64	292786.489968	243256.15	
263	2	4	2018-01-01	0.5462	536042.64	292786.489968	243256.15	

205 rows × 7 columns

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```
q['Month'] = q.Date.dt.month
q['Year'] = q.Date.dt.year
```


q



	Store	Cat	Date	Margin	Sales	Profit	COGS	Month	Year
	1	1	2018-01-01	0.5432	24924.50	13538.988400	11385.51	1	2018
	3	1	2018-02-01	0.5432	46039.49	25008.650968	21030.84	2	2018
	5	1	2018-03-01	0.5432	41595.55	22594.702760	19000.85	3	2018
	6	1	2017-04-01	0.5432	19403.54	10540.002928	8863.54	4	2017

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```
q.groupby('Store')['Profit'].sum()
```



	Store	Cat	Date	Margin	Sales	Profit	COGS	Month	Year
260	2	4	2017-12-01	0.5462	43703.76	23870.993712	19832.77	12	2017
261	2	4	2018-12-01	0.5462	43703.76	23870.993712	19832.77	12	2018

205 rows × 9 columns
dtype: float64


```
q.pivot_table(index = 'Store', values = 'Profit', aggfunc = 'sum')
```



	Store	Profit
1	3.134171e+06	
2	4.342447e+06	

```
f = q.pivot_table(index = ["Store", "Cat"], values = ['Profit', 'Sales'], aggfunc = 'sum')
```


f



	Store	Cat	Profit	Sales
	1	1	7.148990e+05	1316087.94
		2	1.216161e+06	2194444.36
		3	2.678675e+05	513943.80
		4	9.352434e+05	1712272.88
	2	1	1.062919e+06	1956772.84
		2	1.771931e+06	3197277.76
		3	3.364508e+05	645531.04
		4	1.171146e+06	2144170.56

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f.T



	Store	1	2	3	4	1	2	3	4
Profit		7.148990e+05	1.216161e+06	2.678675e+05	9.352434e+05	1.062919e+06	1.771931e+06	3.364508e+05	1.171146e+06
Sales		1.316088e+06	2.194444e+06	513943.80000	1.712273e+06	1.956773e+06	3.197278e+06	645531.040000	2.144171e+06

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