Q1_Soil

October 12, 2023

[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pylab as plt
import seaborn as sns
soil=pd.read_csv("C:/Users/91939/Desktop/1st-MCA/python/python retest/soil -␣
↪soil.csv")
```

[ ]:
```
soil.describe()
```

[ ]:

	Group	pH	N	Dens	P	Ca	\
count	48.000000	48.000000	48.000000	48.000000	48.000000	48.000000	
mean	6.500000	4.669375	0.101938	1.315833	166.166667	8.029375	
std	3.488583	0.671855	0.067159	0.219756	81.160554	3.255946	
min	1.000000	3.740000	0.030000	0.780000	79.000000	3.820000	
25%	3.750000	4.057500	0.050750	1.127500	108.750000	5.040000	
50%	6.500000	4.545000	0.084500	1.400000	131.000000	7.305000	
75%	9.250000	5.140000	0.129250	1.502500	214.250000	9.735000	
max	12.000000	6.670000	0.298000	1.600000	445.000000	16.350000	

	Mg	K	Na	Productivity
count	48.000000	48.000000	48.000000	48.000000
mean	8.464583	0.466250	5.599583	6.588542
std	1.368203	0.223946	3.288983	3.987459
min	5.150000	0.140000	0.600000	0.670000
25%	7.537500	0.275000	2.545000	2.790000
50%	8.515000	0.425000	5.520000	6.635000
75%	9.647500	0.642500	8.355000	9.852500
max	10.960000	1.090000	11.040000	13.320000

[ ]:
```
soil.shape
```

[ ]:
```
(48, 12)
```

[ ]:
```
soil.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 48 entries, 0 to 47
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype
```

```
---  ------        --------------  -----
 0   Group         48 non-null     int64
 1   Contour       48 non-null     object
 2   Depth         48 non-null     object
 3   pH            48 non-null     float64
 4   N             48 non-null     float64
 5   Dens          48 non-null     float64
 6   P             48 non-null     int64
 7   Ca            48 non-null     float64
 8   Mg            48 non-null     float64
 9   K             48 non-null     float64
 10  Na            48 non-null     float64
 11  Productivity  48 non-null     float64
dtypes: float64(8), int64(2), object(2)
memory usage: 4.6+ KB
```

[ ]:
```
soil.isna()
```

[ ]:

	Group	Contour	Depth	pH	N	Dens	P	Ca	Mg	K	\
0	False	False	False	False	False	False	False	False	False	False	
1	False	False	False	False	False	False	False	False	False	False	
2	False	False	False	False	False	False	False	False	False	False	
3	False	False	False	False	False	False	False	False	False	False	
4	False	False	False	False	False	False	False	False	False	False	
5	False	False	False	False	False	False	False	False	False	False	
6	False	False	False	False	False	False	False	False	False	False	
7	False	False	False	False	False	False	False	False	False	False	
8	False	False	False	False	False	False	False	False	False	False	
9	False	False	False	False	False	False	False	False	False	False	
10	False	False	False	False	False	False	False	False	False	False	
11	False	False	False	False	False	False	False	False	False	False	
12	False	False	False	False	False	False	False	False	False	False	
13	False	False	False	False	False	False	False	False	False	False	
14	False	False	False	False	False	False	False	False	False	False	
15	False	False	False	False	False	False	False	False	False	False	
16	False	False	False	False	False	False	False	False	False	False	
17	False	False	False	False	False	False	False	False	False	False	
18	False	False	False	False	False	False	False	False	False	False	
19	False	False	False	False	False	False	False	False	False	False	
20	False	False	False	False	False	False	False	False	False	False	
21	False	False	False	False	False	False	False	False	False	False	
22	False	False	False	False	False	False	False	False	False	False	
23	False	False	False	False	False	False	False	False	False	False	
24	False	False	False	False	False	False	False	False	False	False	
25	False	False	False	False	False	False	False	False	False	False	
26	False	False	False	False	False	False	False	False	False	False	
27	False	False	False	False	False	False	False	False	False	False	

28	False	False	False	False	False	False	False	False	False	False
29	False	False	False	False	False	False	False	False	False	False
30	False	False	False	False	False	False	False	False	False	False
31	False	False	False	False	False	False	False	False	False	False
32	False	False	False	False	False	False	False	False	False	False
33	False	False	False	False	False	False	False	False	False	False
34	False	False	False	False	False	False	False	False	False	False
35	False	False	False	False	False	False	False	False	False	False
36	False	False	False	False	False	False	False	False	False	False
37	False	False	False	False	False	False	False	False	False	False
38	False	False	False	False	False	False	False	False	False	False
39	False	False	False	False	False	False	False	False	False	False
40	False	False	False	False	False	False	False	False	False	False
41	False	False	False	False	False	False	False	False	False	False
42	False	False	False	False	False	False	False	False	False	False
43	False	False	False	False	False	False	False	False	False	False
44	False	False	False	False	False	False	False	False	False	False
45	False	False	False	False	False	False	False	False	False	False
46	False	False	False	False	False	False	False	False	False	False
47	False	False	False	False	False	False	False	False	False	False

	Na	Productivity
0	False	False
1	False	False
2	False	False
3	False	False
4	False	False
5	False	False
6	False	False
7	False	False
8	False	False
9	False	False
10	False	False
11	False	False
12	False	False
13	False	False
14	False	False
15	False	False
16	False	False
17	False	False
18	False	False
19	False	False
20	False	False
21	False	False
22	False	False
23	False	False
24	False	False

```
25  False         False
26  False         False
27  False         False
28  False         False
29  False         False
30  False         False
31  False         False
32  False         False
33  False         False
34  False         False
35  False         False
36  False         False
37  False         False
38  False         False
39  False         False
40  False         False
41  False         False
42  False         False
43  False         False
44  False         False
45  False         False
46  False         False
47  False         False
```

[ ]:
```
soil.isnull()
```

[ ]:
```
    Group  Contour  Depth     pH      N   Dens      P     Ca     Mg      K  \
0   False    False  False  False  False  False  False  False  False  False
1   False    False  False  False  False  False  False  False  False  False
2   False    False  False  False  False  False  False  False  False  False
3   False    False  False  False  False  False  False  False  False  False
4   False    False  False  False  False  False  False  False  False  False
5   False    False  False  False  False  False  False  False  False  False
6   False    False  False  False  False  False  False  False  False  False
7   False    False  False  False  False  False  False  False  False  False
8   False    False  False  False  False  False  False  False  False  False
9   False    False  False  False  False  False  False  False  False  False
10  False    False  False  False  False  False  False  False  False  False
11  False    False  False  False  False  False  False  False  False  False
12  False    False  False  False  False  False  False  False  False  False
13  False    False  False  False  False  False  False  False  False  False
14  False    False  False  False  False  False  False  False  False  False
15  False    False  False  False  False  False  False  False  False  False
16  False    False  False  False  False  False  False  False  False  False
17  False    False  False  False  False  False  False  False  False  False
18  False    False  False  False  False  False  False  False  False  False
19  False    False  False  False  False  False  False  False  False  False
```

20	False	False	False	False	False	False	False	False	False	False
21	False	False	False	False	False	False	False	False	False	False
22	False	False	False	False	False	False	False	False	False	False
23	False	False	False	False	False	False	False	False	False	False
24	False	False	False	False	False	False	False	False	False	False
25	False	False	False	False	False	False	False	False	False	False
26	False	False	False	False	False	False	False	False	False	False
27	False	False	False	False	False	False	False	False	False	False
28	False	False	False	False	False	False	False	False	False	False
29	False	False	False	False	False	False	False	False	False	False
30	False	False	False	False	False	False	False	False	False	False
31	False	False	False	False	False	False	False	False	False	False
32	False	False	False	False	False	False	False	False	False	False
33	False	False	False	False	False	False	False	False	False	False
34	False	False	False	False	False	False	False	False	False	False
35	False	False	False	False	False	False	False	False	False	False
36	False	False	False	False	False	False	False	False	False	False
37	False	False	False	False	False	False	False	False	False	False
38	False	False	False	False	False	False	False	False	False	False
39	False	False	False	False	False	False	False	False	False	False
40	False	False	False	False	False	False	False	False	False	False
41	False	False	False	False	False	False	False	False	False	False
42	False	False	False	False	False	False	False	False	False	False
43	False	False	False	False	False	False	False	False	False	False
44	False	False	False	False	False	False	False	False	False	False
45	False	False	False	False	False	False	False	False	False	False
46	False	False	False	False	False	False	False	False	False	False
47	False	False	False	False	False	False	False	False	False	False

	Na	Productivity
0	False	False
1	False	False
2	False	False
3	False	False
4	False	False
5	False	False
6	False	False
7	False	False
8	False	False
9	False	False
10	False	False
11	False	False
12	False	False
13	False	False
14	False	False
15	False	False
16	False	False

```
17  False         False
18  False         False
19  False         False
20  False         False
21  False         False
22  False         False
23  False         False
24  False         False
25  False         False
26  False         False
27  False         False
28  False         False
29  False         False
30  False         False
31  False         False
32  False         False
33  False         False
34  False         False
35  False         False
36  False         False
37  False         False
38  False         False
39  False         False
40  False         False
41  False         False
42  False         False
43  False         False
44  False         False
45  False         False
46  False         False
47  False         False
```

1. Find the average productivity of soil whose pH level is more than 5 and nitrogen content is less than 10%.

[ ]:
```
ph=soil[soil['pH']>5]
ph_nit=ph[ph['Na']<10]
ph['P'].mean()
```

[ ]:
```
241.41176470588235
```

2. Find the type of contour that has the maximum productivity?

[ ]:
```
a=soil[soil['P']==soil["P"].max()]
print(a)
a['Contour']
```

```
    Group     Contour Depth    pH      N  Dens    P     Ca    Mg     K    Na  \
32      9  Depression  0-10  5.24  0.194   1.0  445  12.27  6.27  0.72  1.02
```

```
    Productivity
32          0.75
```

[ ]:
```
32    Depression
Name: Contour, dtype: object
```

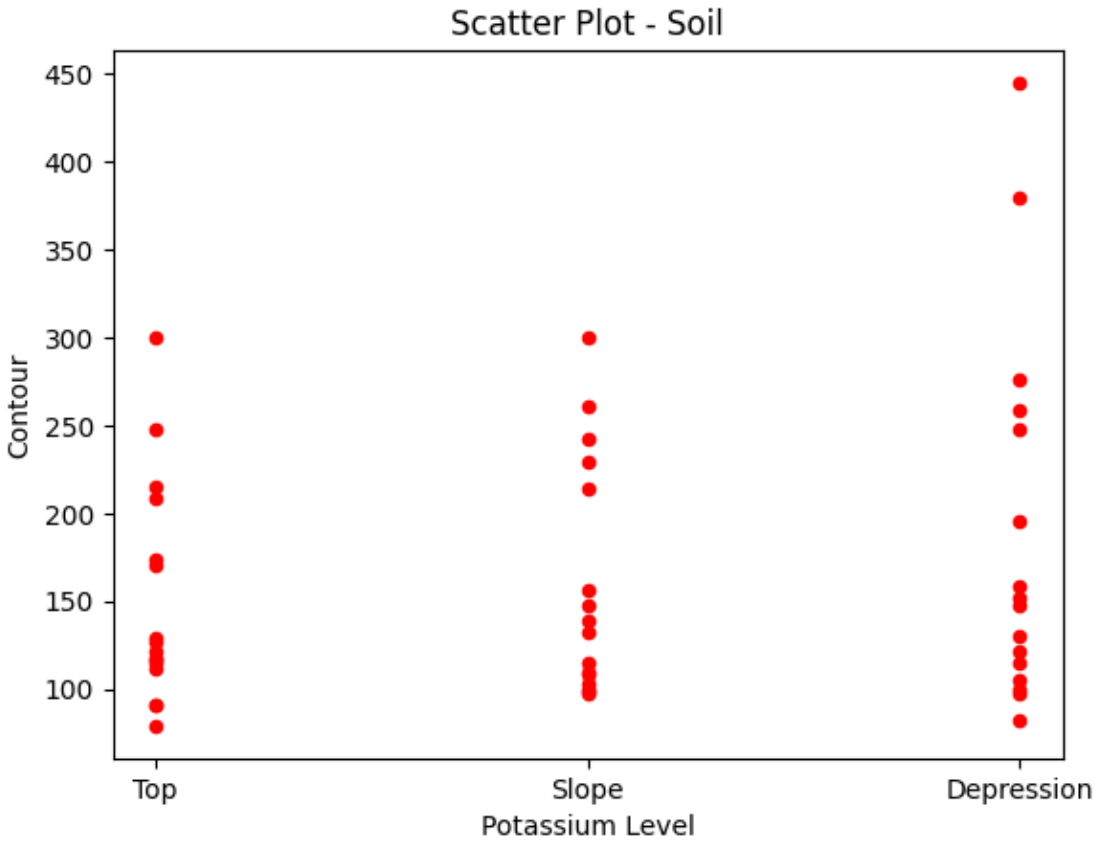
3. What is the minimum productivity of Depression contour?

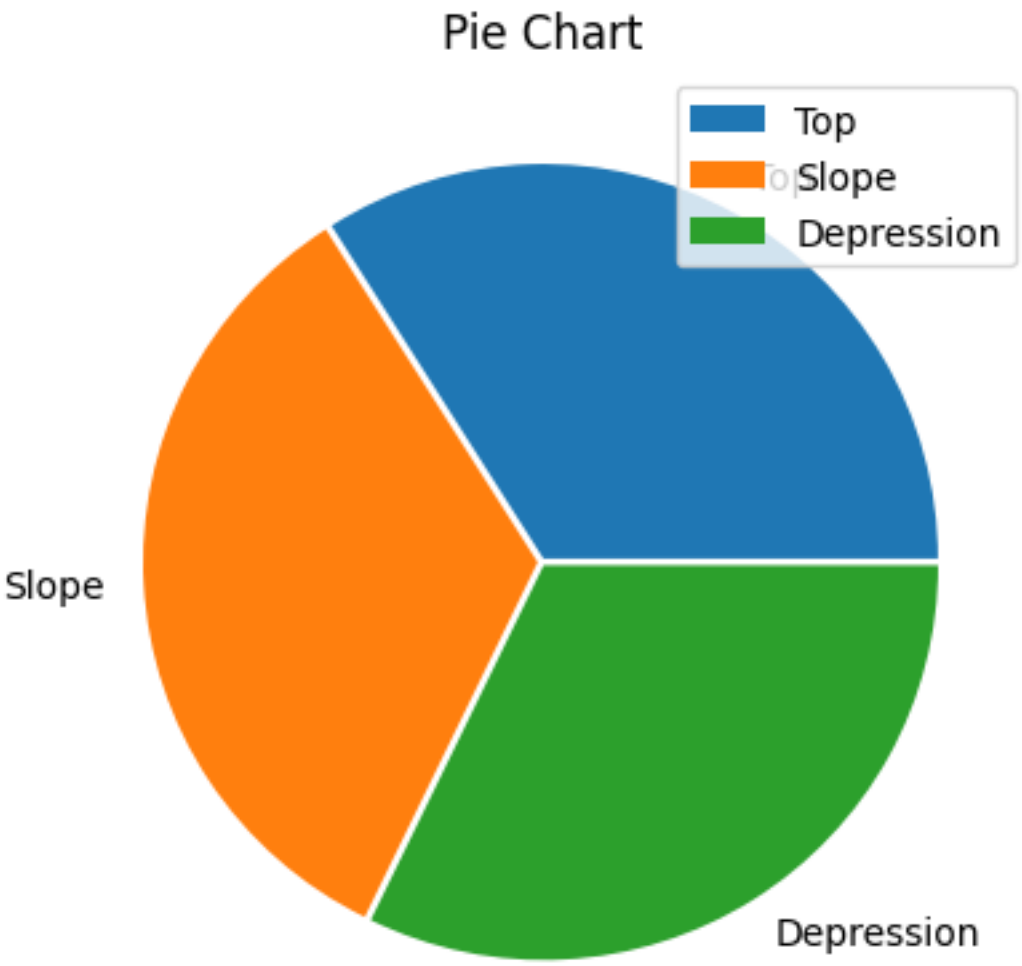
[ ]:
```
dep=soil[soil['Contour']=='Depression']

print("Minimum productiviety with depression Contour is ",dep['P'].min())
```

```
Minimum productiviety with depression Contour is  82
```

4. Is a scatter plot suitable to display the potassium level of each contour? If yes, use scatter plot, else use appropriate charts.

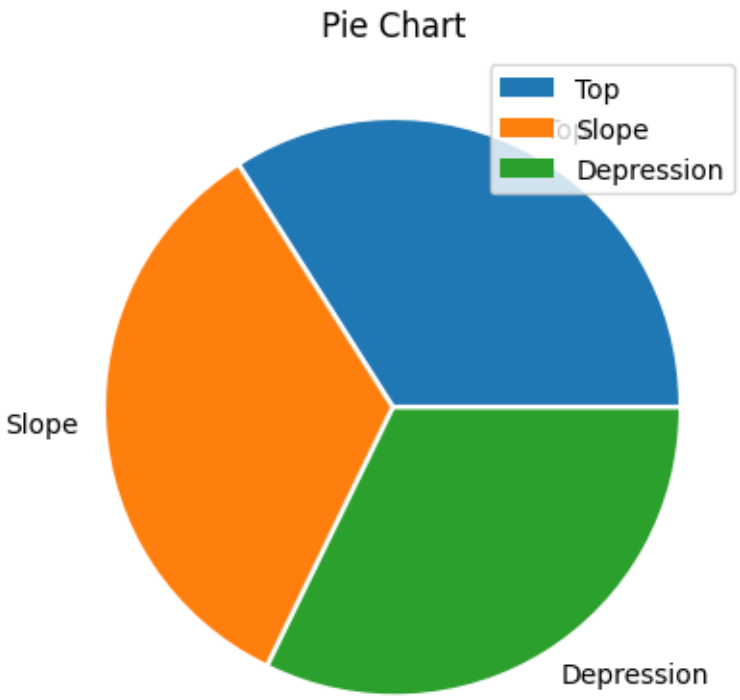
[ ]:
```
soil.plot(x="Contour",y="P", kind="scatter", color="r", fontsize="10")
plt.title("Scatter Plot - Soil")
plt.xlabel("Potassium Level")
plt.ylabel("Contour")
plt.show()
```

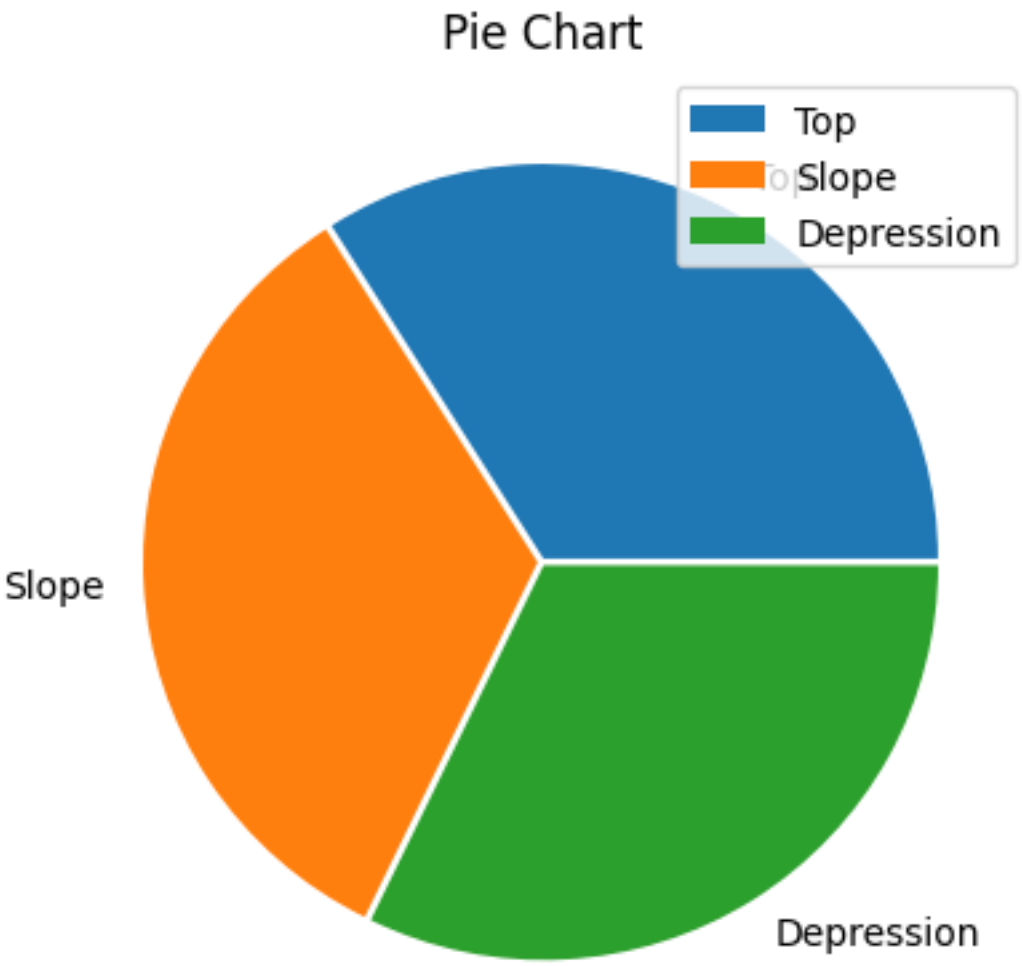




5. Use pie chart to display the average density level of every contour.

[ ]:
```
e=(0.01,0.01,0.01)
Avg=list(soil.groupby('Contour')['Dens'].mean())
plt.pie(Avg,explode=e,labels=['Top','Slope','Depression'])
plt.title('Pie Chart')
plt.legend(title="Soil Contour Density")
plt.legend(loc="upper right")
plt.show()
```


Pie Chart
Top
Slope
Depression
Slope
Depression


Pie Chart
Top
Slope
Depression
Slope
Depression