day-5

July 25, 2023

[1]:
```
import numpy as np
import pandas as pd
from numpy import linalg as la
```

1 1)Matrix

1D

[2]:
```
A = np.array([6,1,1])
print(A)
```

```
[6 1 1]
```

2D

[20]:
```
B = np.array([[1,2],
              [4,5]])
print(B)
```

```
[[1 2]
 [4 5]]
```

3D

[43]:
```
C = np.array([[[1,2],
               [3,4]],
              [[10,20],
               [30,40]],
              [[100,200],
               [300,400]]])
print(C)
```

```
[[[  1   2]
  [  3   4]]

 [[ 10  20]
  [ 30  40]]

 [[100 200]
  [300 400]]]
```

4D

[10]:
```
D = np.array([[[[1, 2], [3, 4]],
               [[5, 6], [7, 8]]],
              [[[9, 10], [11, 12]],
               [[13, 14], [15, 16]]]])
print(D)
```

```
[[[[ 1  2]
   [ 3  4]]

  [[ 5  6]
   [ 7  8]]]


 [[[ 9 10]
   [11 12]]

  [[13 14]
   [15 16]]]]
```

5D

[15]:
```
E = np.array([[[[[1,2],[2,3]],
                [[1,2],[2,3]]],
                [[[1,2],[2,3]],
                [[1,2],[2,3]]]],
                [[[[1,2],[2,3]],
                [[1,2],[2,3]],
                [[[1,2],[2,3]],
                [[1,2],[2,3]]]]])
print(E)
```

```
[[[[[1 2]
    [2 3]]

   [[1 2]
    [2 3]]]


  [[[1 2]
    [2 3]]

   [[1 2]
    [2 3]]]]



 [[[[1 2]
```

```
   [2 3]]

  [[1 2]
   [2 3]]]


 [[[1 2]
   [2 3]]

  [[1 2]
   [2 3]]]]]
```

2 2) Determinants

2d array

[21]:
```
print(la.det(B))
```

```
-2.9999999999999996
```

3d array

[44]:
```
print(la.det(C))
```

```
[-2.e+00 -2.e+02 -2.e+04]
```

4d array

5d array

3 3)

[46]:
```
print(la.matrix_rank(A))
```

```
1
```

[47]:
```
print(la.matrix_rank(B))
```

```
2
```

[48]:
```
print(la.matrix_rank(C))
```

```
[2 2 2]
```

[49]:
```
print(la.matrix_rank(D))
```

```
[[2 2]
 [2 2]]
```

[50]:
```
print(la.matrix_rank(E))
```

```
[[[2 2]
  [2 2]]

 [[2 2]
  [2 2]]]
```

diagonal

[54]:
```
print(np.diag(A))
```

```
[[6 0 0]
 [0 1 0]
 [0 0 1]]
```

[55]:
```
print(np.diag(B))
```

```
[1 5]
```

trace

[58]:
```
print(np.trace(B))
```

```
6
```

[59]:
```
print(np.trace(C))
```

```
[31 42]
```

[61]:
```
print(np.trace(D))
```

```
[[14 16]
 [18 20]]
```

[62]:
```
print(np.trace(E))
```

```
[[[2 4]
  [4 6]]

 [[2 4]
  [4 6]]]
```

4 5)

[64]:
```
print(la.eig(B))
```

```
EigResult(eigenvalues=array([-0.46410162,  6.46410162]),
eigenvectors=array([[-0.80689822, -0.34372377],
       [ 0.59069049, -0.9390708 ]]))
```

[66]:
```
print(la.eig(C))
```

```
EigResult(eigenvalues=array([[-3.72281323e-01,  5.37228132e+00],
       [-3.72281323e+00,  5.37228132e+01],
       [-3.72281323e+01,  5.37228132e+02]]), eigenvectors=array([[[-0.82456484,
-0.41597356],
        [ 0.56576746, -0.90937671]],

       [[-0.82456484, -0.41597356],
        [ 0.56576746, -0.90937671]],

       [[-0.82456484, -0.41597356],
        [ 0.56576746, -0.90937671]]]))
```

[67]:
```
print(la.eig(D))
```

```
EigResult(eigenvalues=array([[[-0.37228132,  5.37228132],
        [-0.15206735, 13.15206735]],

       [[-0.09481005, 21.09481005],
        [-0.06880228, 29.06880228]]]), eigenvectors=array([[[[-0.82456484,
-0.41597356],
         [ 0.56576746, -0.90937671]],

        [[-0.75868086, -0.59276441],
         [ 0.65146248, -0.80537591]]],


       [[[-0.73979641, -0.63720844],
         [ 0.67283079, -0.77069151]],

        [[-0.73099964, -0.65690325],
         [ 0.68237784, -0.75397488]]]]))
```

[68]:
```
print(la.eig(E))
```

```
EigResult(eigenvalues=array([[[[-0.23606798,  4.23606798],
         [-0.23606798,  4.23606798]],

        [[-0.23606798,  4.23606798],
         [-0.23606798,  4.23606798]]],


       [[[-0.23606798,  4.23606798],
         [-0.23606798,  4.23606798]],

        [[-0.23606798,  4.23606798],
         [-0.23606798,  4.23606798]]]]), eigenvectors=array([[[[[-0.85065081,
-0.52573111],
          [ 0.52573111, -0.85065081]],
```

```
        [[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]]],


       [[[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]],

        [[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]]]],



      [[[[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]],

        [[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]]],


       [[[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]],

        [[-0.85065081, -0.52573111],
         [ 0.52573111, -0.85065081]]]]]))
```

5 EDA

[1]:
```
import pandas as pd
```

[2]:
```
df = pd.read_csv(r"C:\Users\SHREYAS\Downloads\8_BreastCancerPrediction.csv")
df
```

[2]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	\
0	842302	M	17.99	10.38	122.80	1001.0	
1	842517	M	20.57	17.77	132.90	1326.0	
2	84300903	M	19.69	21.25	130.00	1203.0	
3	84348301	M	11.42	20.38	77.58	386.1	
4	84358402	M	20.29	14.34	135.10	1297.0	
..	…	…	…	…	…	…	
564	926424	M	21.56	22.39	142.00	1479.0	
565	926682	M	20.13	28.25	131.20	1261.0	
566	926954	M	16.60	28.08	108.30	858.1	
567	927241	M	20.60	29.33	140.10	1265.0	
568	92751	B	7.76	24.54	47.92	181.0	

	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	\
0	0.11840	0.27760	0.30010	0.14710	

```
1            0.08474           0.07864         0.08690              0.07017
2            0.10960           0.15990         0.19740              0.12790
3            0.14250           0.28390         0.24140              0.10520
4            0.10030           0.13280         0.19800              0.10430
..               …                 …               …                    …
564          0.11100           0.11590         0.24390              0.13890
565          0.09780           0.10340         0.14400              0.09791
566          0.08455           0.10230         0.09251              0.05302
567          0.11780           0.27700         0.35140              0.15200
568          0.05263           0.04362         0.00000              0.00000

     …  texture_worst  perimeter_worst  area_worst  smoothness_worst  \
0    …          17.33           184.60      2019.0           0.16220
1    …          23.41           158.80      1956.0           0.12380
2    …          25.53           152.50      1709.0           0.14440
3    …          26.50            98.87       567.7           0.20980
4    …          16.67           152.20      1575.0           0.13740
..   …            …                …           …                …
564  …          26.40           166.10      2027.0           0.14100
565  …          38.25           155.00      1731.0           0.11660
566  …          34.12           126.70      1124.0           0.11390
567  …          39.42           184.60      1821.0           0.16500
568  …          30.37            59.16       268.6           0.08996

     compactness_worst  concavity_worst  concave points_worst  symmetry_worst  \
0              0.66560           0.7119                0.2654          0.4601
1              0.18660           0.2416                0.1860          0.2750
2              0.42450           0.4504                0.2430          0.3613
3              0.86630           0.6869                0.2575          0.6638
4              0.20500           0.4000                0.1625          0.2364
..                 …                …                     …               …
564            0.21130           0.4107                0.2216          0.2060
565            0.19220           0.3215                0.1628          0.2572
566            0.30940           0.3403                0.1418          0.2218
567            0.86810           0.9387                0.2650          0.4087
568            0.06444           0.0000                0.0000          0.2871

     fractal_dimension_worst  Unnamed: 32
0                    0.11890          NaN
1                    0.08902          NaN
2                    0.08758          NaN
3                    0.17300          NaN
4                    0.07678          NaN
..                       …            …
564                  0.07115          NaN
565                  0.06637          NaN
566                  0.07820          NaN
```

```
567                 0.12400          NaN
568                 0.07039          NaN

[569 rows x 33 columns]
```

[3]:
```
df.isnull()
```

[3]:
```
        id  diagnosis  radius_mean  texture_mean  perimeter_mean  area_mean  \
0    False      False        False         False           False      False
1    False      False        False         False           False      False
2    False      False        False         False           False      False
3    False      False        False         False           False      False
4    False      False        False         False           False      False
..     …          …            …             …               …          …
564  False      False        False         False           False      False
565  False      False        False         False           False      False
566  False      False        False         False           False      False
567  False      False        False         False           False      False
568  False      False        False         False           False      False

     smoothness_mean  compactness_mean  concavity_mean  concave points_mean  \
0              False             False           False                False
1              False             False           False                False
2              False             False           False                False
3              False             False           False                False
4              False             False           False                False
..               …                 …               …                    …
564            False             False           False                False
565            False             False           False                False
566            False             False           False                False
567            False             False           False                False
568            False             False           False                False

     …  texture_worst  perimeter_worst  area_worst  smoothness_worst  \
0    …          False            False       False             False
1    …          False            False       False             False
2    …          False            False       False             False
3    …          False            False       False             False
4    …          False            False       False             False
..   …            …                …           …                 …
564  …          False            False       False             False
565  …          False            False       False             False
566  …          False            False       False             False
567  …          False            False       False             False
568  …          False            False       False             False

     compactness_worst  concavity_worst  concave points_worst  symmetry_worst  \
```

```
0               False           False                False           False
1               False           False                False           False
2               False           False                False           False
3               False           False                False           False
4               False           False                False           False
..                ...             ...                  ...             ...
564             False           False                False           False
565             False           False                False           False
566             False           False                False           False
567             False           False                False           False
568             False           False                False           False

     fractal_dimension_worst  Unnamed: 32
0                      False         True
1                      False         True
2                      False         True
3                      False         True
4                      False         True
..                       ...          ...
564                    False         True
565                    False         True
566                    False         True
567                    False         True
568                    False         True

[569 rows x 33 columns]
```

[5]:
```
d1 = df.fillna(value=1)
d1
```

[5]:
```
           id diagnosis  radius_mean  texture_mean  perimeter_mean  area_mean  \
0      842302         M        17.99         10.38          122.80     1001.0
1      842517         M        20.57         17.77          132.90     1326.0
2    84300903         M        19.69         21.25          130.00     1203.0
3    84348301         M        11.42         20.38           77.58      386.1
4    84358402         M        20.29         14.34          135.10     1297.0
..        ...       ...          ...           ...             ...        ...
564    926424         M        21.56         22.39          142.00     1479.0
565    926682         M        20.13         28.25          131.20     1261.0
566    926954         M        16.60         28.08          108.30      858.1
567    927241         M        20.60         29.33          140.10     1265.0
568     92751         B         7.76         24.54           47.92      181.0

     smoothness_mean  compactness_mean  concavity_mean  concave points_mean  \
0            0.11840           0.27760         0.30010              0.14710
1            0.08474           0.07864         0.08690              0.07017
2            0.10960           0.15990         0.19740              0.12790
```

```
3           0.14250           0.28390         0.24140              0.10520
4           0.10030           0.13280         0.19800              0.10430
..              …                 …               …                    …
564         0.11100           0.11590         0.24390              0.13890
565         0.09780           0.10340         0.14400              0.09791
566         0.08455           0.10230         0.09251              0.05302
567         0.11780           0.27700         0.35140              0.15200
568         0.05263           0.04362         0.00000              0.00000

     …  texture_worst  perimeter_worst  area_worst  smoothness_worst  \
0    …          17.33           184.60      2019.0           0.16220
1    …          23.41           158.80      1956.0           0.12380
2    …          25.53           152.50      1709.0           0.14440
3    …          26.50            98.87       567.7           0.20980
4    …          16.67           152.20      1575.0           0.13740
..   …            …                …           …                …
564  …          26.40           166.10      2027.0           0.14100
565  …          38.25           155.00      1731.0           0.11660
566  …          34.12           126.70      1124.0           0.11390
567  …          39.42           184.60      1821.0           0.16500
568  …          30.37            59.16       268.6           0.08996

     compactness_worst  concavity_worst  concave points_worst  symmetry_worst  \
0              0.66560           0.7119                0.2654          0.4601
1              0.18660           0.2416                0.1860          0.2750
2              0.42450           0.4504                0.2430          0.3613
3              0.86630           0.6869                0.2575          0.6638
4              0.20500           0.4000                0.1625          0.2364
..                 …                …                     …               …
564            0.21130           0.4107                0.2216          0.2060
565            0.19220           0.3215                0.1628          0.2572
566            0.30940           0.3403                0.1418          0.2218
567            0.86810           0.9387                0.2650          0.4087
568            0.06444           0.0000                0.0000          0.2871

     fractal_dimension_worst  Unnamed: 32
0                    0.11890          1.0
1                    0.08902          1.0
2                    0.08758          1.0
3                    0.17300          1.0
4                    0.07678          1.0
..                       …            …
564                  0.07115          1.0
565                  0.06637          1.0
566                  0.07820          1.0
567                  0.12400          1.0
568                  0.07039          1.0
```

```
[569 rows x 33 columns]
```

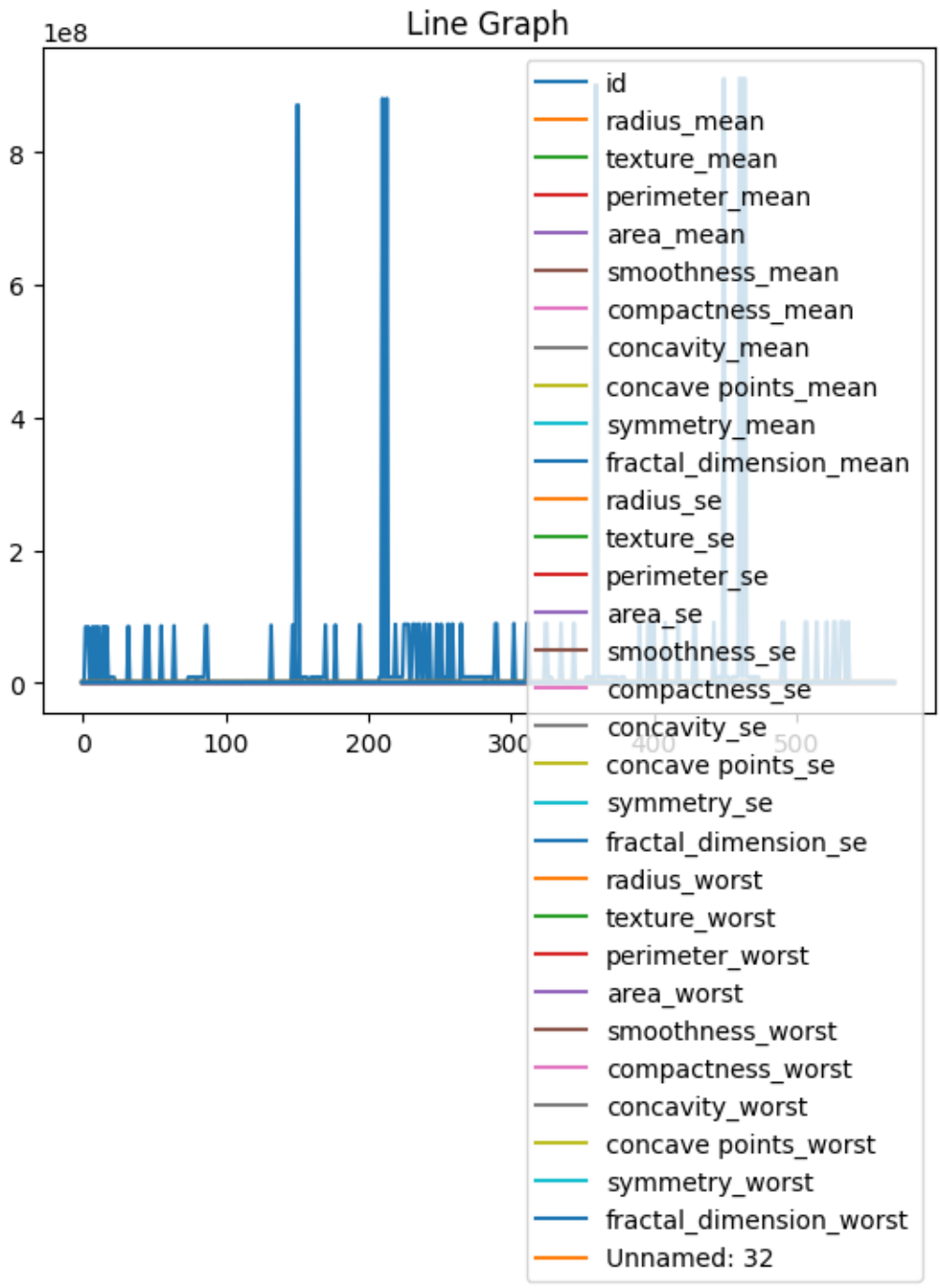
[8]:
```
d2 = df.dropna(axis=1)
d2
```

[8]:
```
           id diagnosis  radius_mean  texture_mean  perimeter_mean  area_mean  \
0      842302         M        17.99         10.38          122.80     1001.0
1      842517         M        20.57         17.77          132.90     1326.0
2    84300903         M        19.69         21.25          130.00     1203.0
3    84348301         M        11.42         20.38           77.58      386.1
4    84358402         M        20.29         14.34          135.10     1297.0
..        …       …           …             …               …         …
564    926424         M        21.56         22.39          142.00     1479.0
565    926682         M        20.13         28.25          131.20     1261.0
566    926954         M        16.60         28.08          108.30      858.1
567    927241         M        20.60         29.33          140.10     1265.0
568     92751         B         7.76         24.54           47.92      181.0

     smoothness_mean  compactness_mean  concavity_mean  concave points_mean  \
0            0.11840           0.27760         0.30010              0.14710
1            0.08474           0.07864         0.08690              0.07017
2            0.10960           0.15990         0.19740              0.12790
3            0.14250           0.28390         0.24140              0.10520
4            0.10030           0.13280         0.19800              0.10430
..               …                 …               …                    …
564          0.11100           0.11590         0.24390              0.13890
565          0.09780           0.10340         0.14400              0.09791
566          0.08455           0.10230         0.09251              0.05302
567          0.11780           0.27700         0.35140              0.15200
568          0.05263           0.04362         0.00000              0.00000

     …  radius_worst  texture_worst  perimeter_worst  area_worst  \
0    …        25.380          17.33           184.60      2019.0
1    …        24.990          23.41           158.80      1956.0
2    …        23.570          25.53           152.50      1709.0
3    …        14.910          26.50            98.87       567.7
4    …        22.540          16.67           152.20      1575.0
..   …           …              …                …          …
564  …        25.450          26.40           166.10      2027.0
565  …        23.690          38.25           155.00      1731.0
566  …        18.980          34.12           126.70      1124.0
567  …        25.740          39.42           184.60      1821.0
568  …         9.456          30.37            59.16       268.6

     smoothness_worst  compactness_worst  concavity_worst  \
0             0.16220            0.66560           0.7119
```

```
1              0.12380           0.18660          0.2416
2              0.14440           0.42450          0.4504
3              0.20980           0.86630          0.6869
4              0.13740           0.20500          0.4000
..                 …                 …               …
564            0.14100           0.21130          0.4107
565            0.11660           0.19220          0.3215
566            0.11390           0.30940          0.3403
567            0.16500           0.86810          0.9387
568            0.08996           0.06444          0.0000

     concave points_worst  symmetry_worst  fractal_dimension_worst
0                  0.2654          0.4601                  0.11890
1                  0.1860          0.2750                  0.08902
2                  0.2430          0.3613                  0.08758
3                  0.2575          0.6638                  0.17300
4                  0.1625          0.2364                  0.07678
..                    …               …                        …
564                0.2216          0.2060                  0.07115
565                0.1628          0.2572                  0.06637
566                0.1418          0.2218                  0.07820
567                0.2650          0.4087                  0.12400
568                0.0000          0.2871                  0.07039

[569 rows x 32 columns]
```

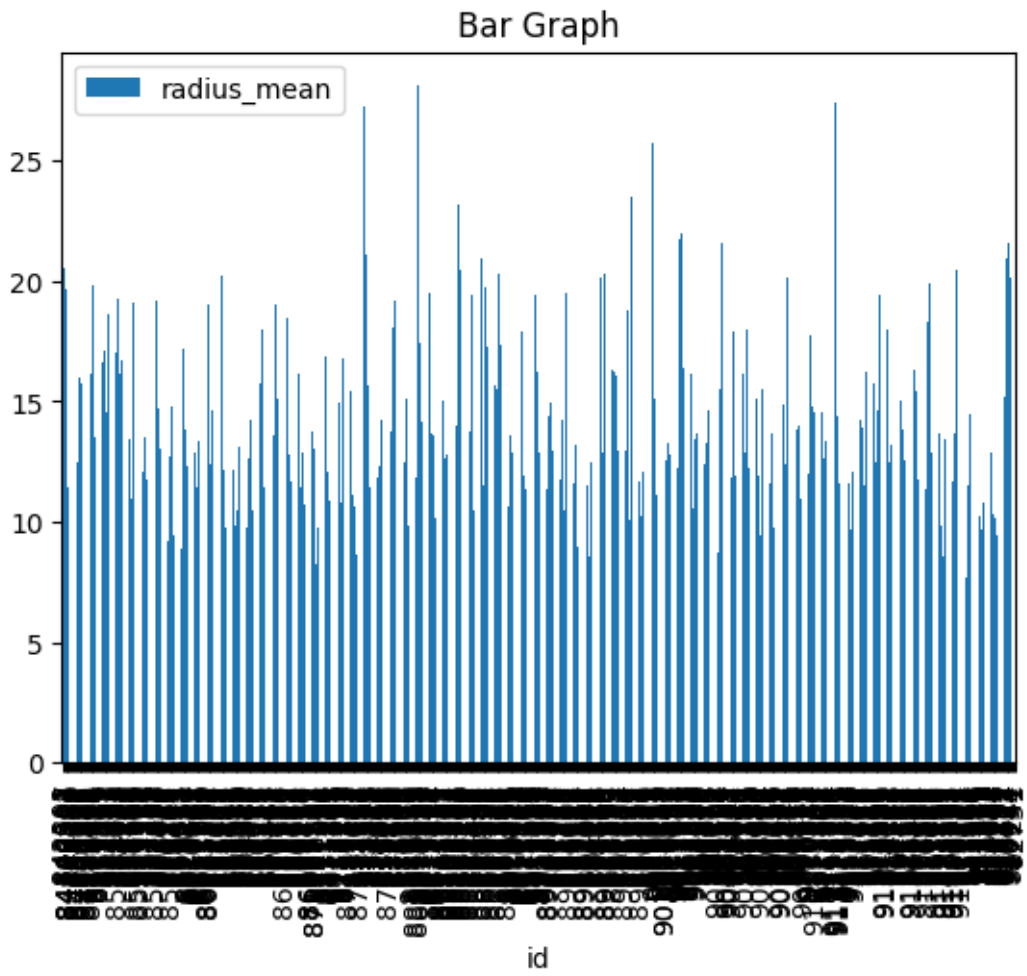
[13]:
```
df.plot.line(title="Line Graph")
```

[13]:
```
<Axes: title={'center': 'Line Graph'}>
```



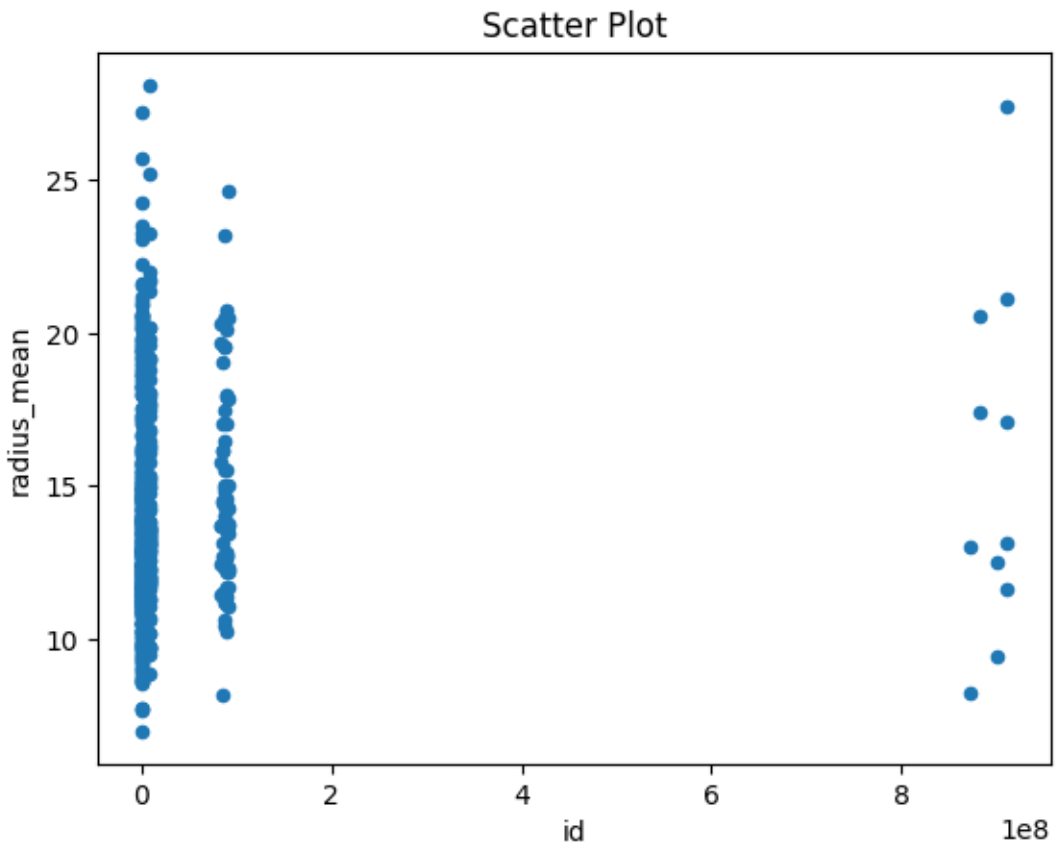
[12]:
```
df.plot.bar(x="id",y="radius_mean",title="Bar Graph")
```

[12]:
```
<Axes: title={'center': 'Bar Graph'}, xlabel='id'>
```



[14]:
```
df.plot.scatter(x="id",y="radius_mean",title="Scatter Plot")
```

[14]: <Axes: title={'center': 'Scatter Plot'}, xlabel='id', ylabel='radius_mean'>

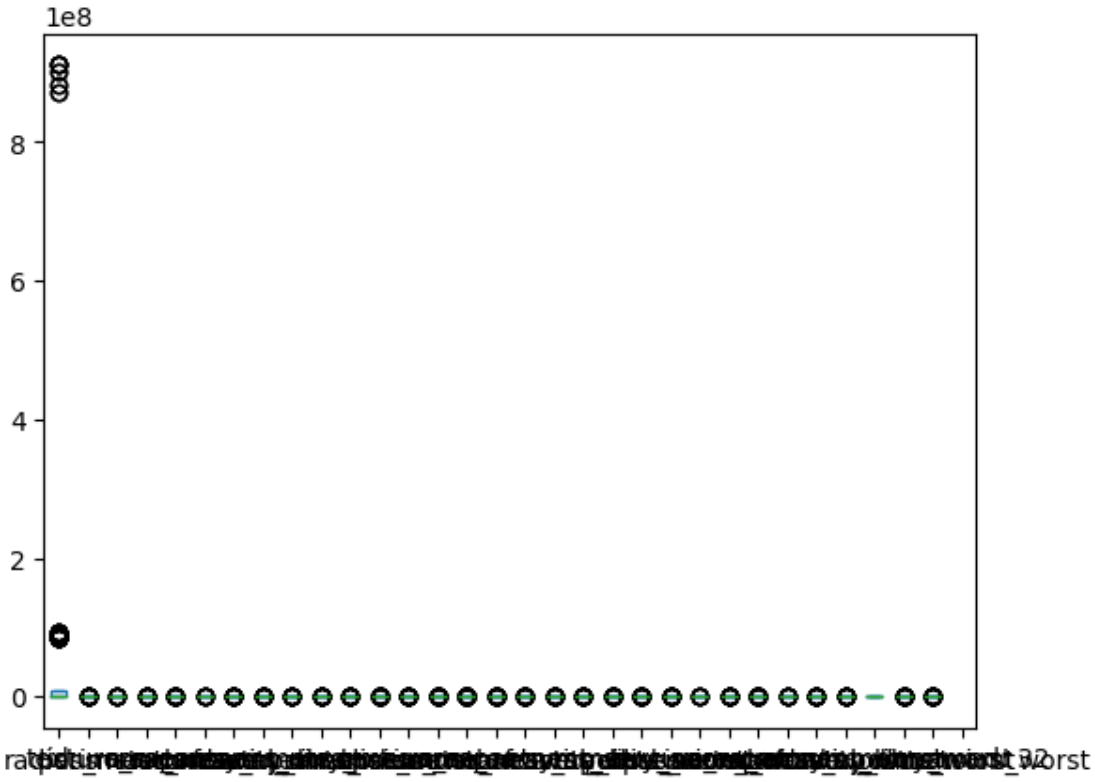


[15]:
```
df.plot.pie(y="radius_mean",title="Pie Chart")
```

[15]:
```
<Axes: title={'center': 'Pie Chart'}, ylabel='radius_mean'>
```

[16]:
```
df.plot.box()
```

[16]: <Axes: >



6 Dataset 2

[32]:
```
data = pd.read_csv(r"C:\Users\SHREYAS\Downloads\9_bottle.csv")
data
```

```
C:\Users\SHREYAS\AppData\Local\Temp\ipykernel_6856\1714720592.py:1:
DtypeWarning: Columns (47,73) have mixed types. Specify dtype option on import
or set low_memory=False.
  data = pd.read_csv(r"C:\Users\SHREYAS\Downloads\9_bottle.csv")
```

[32]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3

```
4              1        5  054.0 056.0  19-4903CR-HY-060-0930-05400560-0020A-7
…            …      …          …                                          …
864858     34404   864859  093.4 026.4  20-1611SR-MX-310-2239-09340264-0000A-7
864859     34404   864860  093.4 026.4  20-1611SR-MX-310-2239-09340264-0002A-3
864860     34404   864861  093.4 026.4  20-1611SR-MX-310-2239-09340264-0005A-3
864861     34404   864862  093.4 026.4  20-1611SR-MX-310-2239-09340264-0010A-3
864862     34404   864863  093.4 026.4  20-1611SR-MX-310-2239-09340264-0015A-3

         Depthm  T_degC   Salnty  O2ml_L    STheta   O2Sat  …  R_PHAEO  \
0             0  10.500  33.4400     NaN  25.64900     NaN  …      NaN
1             8  10.460  33.4400     NaN  25.65600     NaN  …      NaN
2            10  10.460  33.4370     NaN  25.65400     NaN  …      NaN
3            19  10.450  33.4200     NaN  25.64300     NaN  …      NaN
4            20  10.450  33.4210     NaN  25.64300     NaN  …      NaN
…          …      …       …      …       …     …  …      …
864858        0  18.744  33.4083   5.805  23.87055  108.74  …     0.18
864859        2  18.744  33.4083   5.805  23.87072  108.74  …     0.18
864860        5  18.692  33.4150   5.796  23.88911  108.46  …     0.18
864861       10  18.161  33.4062   5.816  24.01426  107.74  …     0.31
864862       15  17.533  33.3880   5.774  24.15297  105.66  …     0.61

         R_PRES  R_SAMP  DIC1  DIC2  TA1  TA2  pH2  pH1  DIC Quality Comment
0             0     NaN   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
1             8     NaN   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
2            10     NaN   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
3            19     NaN   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
4            20     NaN   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
…          …      …    …   …   …  …  …  …                    …
864858        0     NaN   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
864859        2     4.0   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
864860        5     3.0   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
864861       10     2.0   NaN   NaN  NaN  NaN  NaN  NaN                  NaN
864862       15     1.0   NaN   NaN  NaN  NaN  NaN  NaN                  NaN

[864863 rows x 74 columns]
```

[18]:
```
data.isnull()
```

[18]:
```
         Cst_Cnt  Btl_Cnt  Sta_ID  Depth_ID  Depthm  T_degC  Salnty  O2ml_L  \
0          False    False   False     False   False   False   False    True
1          False    False   False     False   False   False   False    True
2          False    False   False     False   False   False   False    True
3          False    False   False     False   False   False   False    True
4          False    False   False     False   False   False   False    True
…          …      …      …       …       …     …      …      …
864858     False    False   False     False   False   False   False   False
864859     False    False   False     False   False   False   False   False
```

```
864860    False    False   False     False   False   False   False   False
864861    False    False   False     False   False   False   False   False
864862    False    False   False     False   False   False   False   False

        STheta  O2Sat  …  R_PHAEO  R_PRES  R_SAMP  DIC1  DIC2   TA1   TA2  \
0        False   True  …     True   False    True  True  True  True  True
1        False   True  …     True   False    True  True  True  True  True
2        False   True  …     True   False    True  True  True  True  True
3        False   True  …     True   False    True  True  True  True  True
4        False   True  …     True   False    True  True  True  True  True
…          …     …  …       …      …       …    …    …    …    …
864858   False  False  …    False   False    True  True  True  True  True
864859   False  False  …    False   False   False  True  True  True  True
864860   False  False  …    False   False   False  True  True  True  True
864861   False  False  …    False   False   False  True  True  True  True
864862   False  False  …    False   False   False  True  True  True  True

         pH2   pH1  DIC Quality Comment
0       True  True                True
1       True  True                True
2       True  True                True
3       True  True                True
4       True  True                True
…       …     …                   …
864858  True  True                True
864859  True  True                True
864860  True  True                True
864861  True  True                True
864862  True  True                True

[864863 rows x 74 columns]
```

[19]:
```
data1 = data.fillna(value=0)
data1
```

[19]:
```
        Cst_Cnt  Btl_Cnt       Sta_ID                                  Depth_ID  \
0             1        1  054.0 056.0  19-4903CR-HY-060-0930-05400560-0000A-3
1             1        2  054.0 056.0  19-4903CR-HY-060-0930-05400560-0008A-3
2             1        3  054.0 056.0  19-4903CR-HY-060-0930-05400560-0010A-7
3             1        4  054.0 056.0  19-4903CR-HY-060-0930-05400560-0019A-3
4             1        5  054.0 056.0  19-4903CR-HY-060-0930-05400560-0020A-7
…           …        …          …                                       …
864858    34404   864859  093.4 026.4  20-1611SR-MX-310-2239-09340264-0000A-7
864859    34404   864860  093.4 026.4  20-1611SR-MX-310-2239-09340264-0002A-3
864860    34404   864861  093.4 026.4  20-1611SR-MX-310-2239-09340264-0005A-3
864861    34404   864862  093.4 026.4  20-1611SR-MX-310-2239-09340264-0010A-3
864862    34404   864863  093.4 026.4  20-1611SR-MX-310-2239-09340264-0015A-3
```

```
        Depthm  T_degC   Salnty  O2ml_L    STheta   O2Sat  …  R_PHAEO  \
0            0  10.500  33.4400   0.000  25.64900    0.00  …     0.00
1            8  10.460  33.4400   0.000  25.65600    0.00  …     0.00
2           10  10.460  33.4370   0.000  25.65400    0.00  …     0.00
3           19  10.450  33.4200   0.000  25.64300    0.00  …     0.00
4           20  10.450  33.4210   0.000  25.64300    0.00  …     0.00
…          …      …       …      …       …     …  …      …
864858       0  18.744  33.4083   5.805  23.87055  108.74  …     0.18
864859       2  18.744  33.4083   5.805  23.87072  108.74  …     0.18
864860       5  18.692  33.4150   5.796  23.88911  108.46  …     0.18
864861      10  18.161  33.4062   5.816  24.01426  107.74  …     0.31
864862      15  17.533  33.3880   5.774  24.15297  105.66  …     0.61

        R_PRES  R_SAMP  DIC1  DIC2  TA1  TA2  pH2  pH1  DIC Quality Comment
0            0     0.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
1            8     0.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
2           10     0.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
3           19     0.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
4           20     0.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
…          …      …    …    …   …  …  …  …  …                      …
864858       0     0.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
864859       2     4.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
864860       5     3.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
864861      10     2.0   0.0   0.0  0.0  0.0  0.0  0.0                    0
864862      15     1.0   0.0   0.0  0.0  0.0  0.0  0.0                    0

[864863 rows x 74 columns]
```

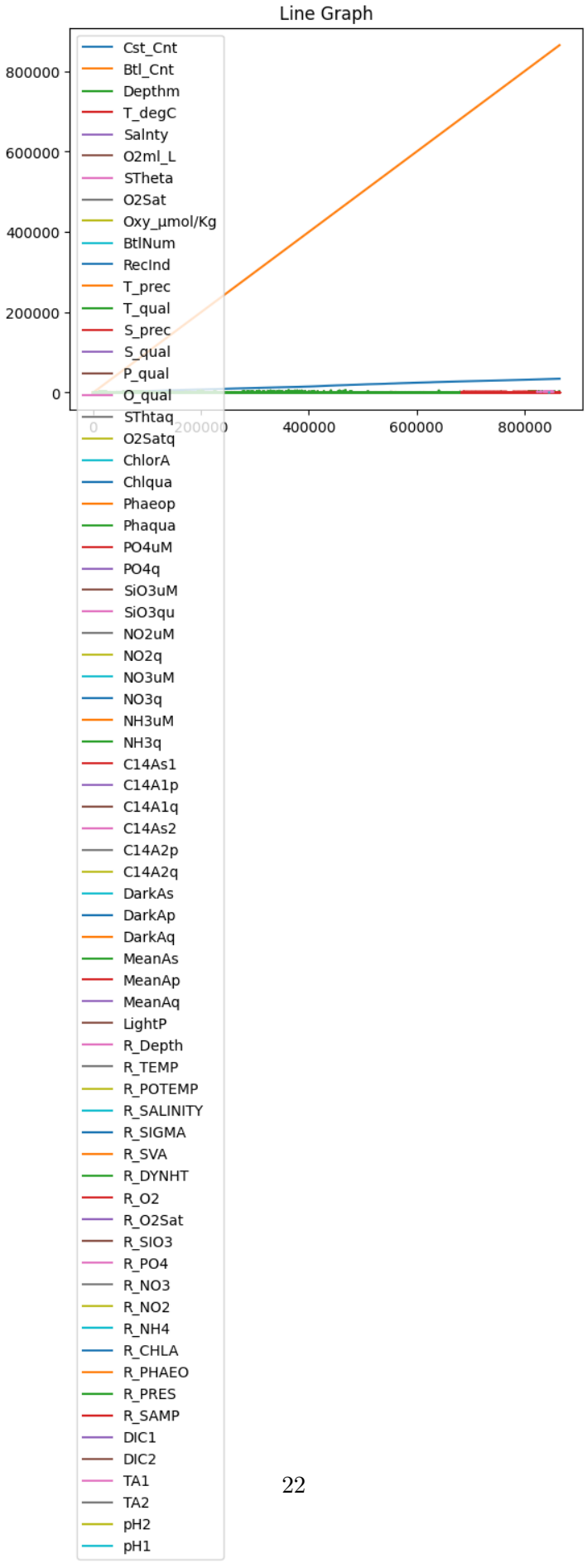
[22]:
```
data2 = data.dropna(axis=)
data2
```

[22]:
```
        Cst_Cnt  Btl_Cnt       Sta_ID                                Depth_ID  \
0             1        1  054.0 056.0  19-4903CR-HY-060-0930-05400560-0000A-3
1             1        2  054.0 056.0  19-4903CR-HY-060-0930-05400560-0008A-3
2             1        3  054.0 056.0  19-4903CR-HY-060-0930-05400560-0010A-7
3             1        4  054.0 056.0  19-4903CR-HY-060-0930-05400560-0019A-3
4             1        5  054.0 056.0  19-4903CR-HY-060-0930-05400560-0020A-7
…           …      …           …                                      …
864858    34404   864859  093.4 026.4  20-1611SR-MX-310-2239-09340264-0000A-7
864859    34404   864860  093.4 026.4  20-1611SR-MX-310-2239-09340264-0002A-3
864860    34404   864861  093.4 026.4  20-1611SR-MX-310-2239-09340264-0005A-3
864861    34404   864862  093.4 026.4  20-1611SR-MX-310-2239-09340264-0010A-3
864862    34404   864863  093.4 026.4  20-1611SR-MX-310-2239-09340264-0015A-3

        Depthm  RecInd  R_Depth  R_PRES
0            0       3      0.0       0
```

```
1            8       3      8.0       8
2           10       7     10.0      10
3           19       3     19.0      19
4           20       7     20.0      20
…          …      …       …      …
864858       0       7      0.0       0
864859       2       3      2.0       2
864860       5       3      5.0       5
864861      10       3     10.0      10
864862      15       3     15.0      15

[864863 rows x 8 columns]
```

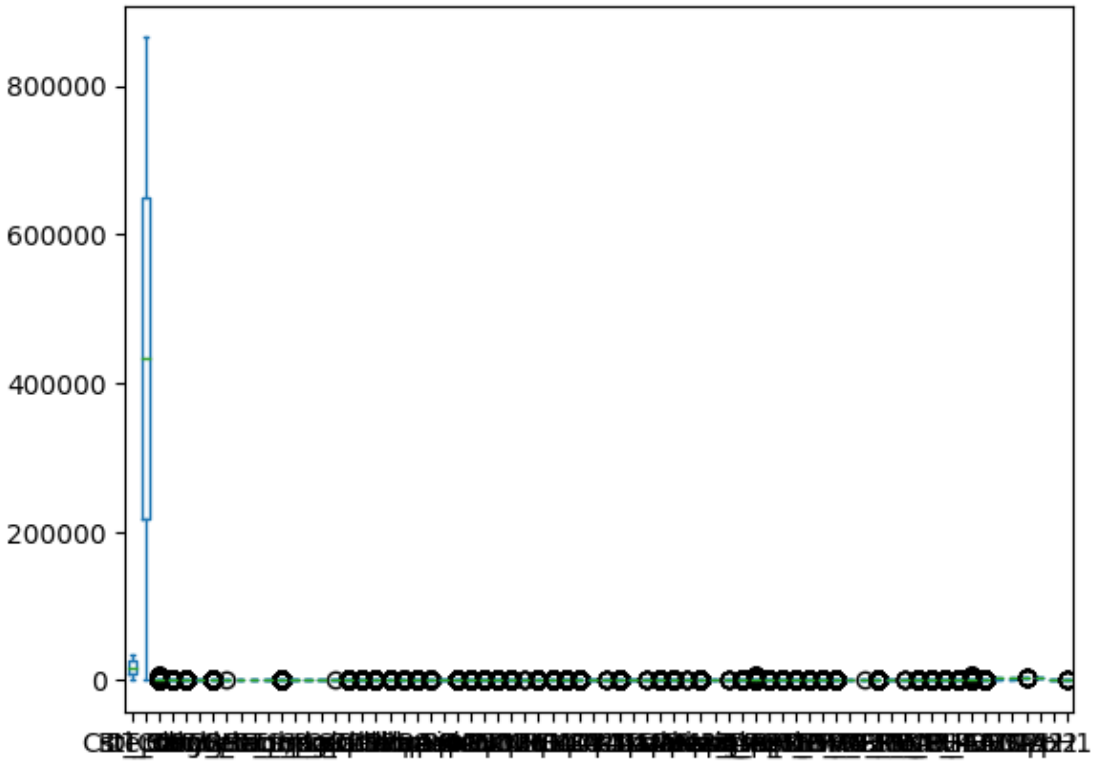
[26]:
```
data.plot.line(title="Line Graph")
```

[26]:
```
<Axes: title={'center': 'Line Graph'}>
```


Line Graph
800000
600000
400000
200000
0
0
200000
400000
600000
800000
Cst_Cnt
Btl_Cnt
Depthm
T_degC
Salnty
O2ml_L
STheta
O2Sat
Oxy_µmol/Kg
BtlNum
RecInd
T_prec
T_qual
S_prec
S_qual
P_qual
O_qual
SThtaq
O2Satq
ChlorA
Chlqua
Phaeop
Phaqua
PO4uM
PO4q
SiO3uM
SiO3qu
NO2uM
NO2q
NO3uM
NO3q
NH3uM
NH3q
C14As1
C14A1p
C14A1q
C14As2
C14A2p
C14A2q
DarkAs
DarkAp
DarkAq
MeanAs
MeanAp
MeanAq
LightP
R_Depth
R_TEMP
R_POTEMP
R_SALINITY
R_SIGMA
R_SVA
R_DYNHT
R_O2
R_O2Sat
R_SIO3
R_PO4
R_NO3
R_NO2
R_NH4
R_CHLA
R_PHAEO
R_PRES
R_SAMP
DIC1
DIC2
TA1
TA2
pH2
pH1

[34]:
```
data.plot.box()
```

[34]: <Axes: >



[ ]:
```
data.plot.bar(title="Bar Graph")
```

[ ]:
```
data.plot.scatter(x="Cst_Cnt",y="RecInd",title="Scatter Plot")
```

[ ]:
```

```