Import the required packages

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Read the data

In [2]:

```
file_location="C:\\Users\\omkar\\OneDrive\\Documents\\Data science\\Naresh I
visa_df=pd.read_csv(file_location)
visa_df.head()
```

Out[2]:

	case_id	continent	education_of_employee	has_job_experience	requires_job_training	no_
0	EZYV01	Asia	High School	N	N	
1	EZYV02	Asia	Master's	Y	N	
2	EZYV03	Asia	Bachelor's	N	Y	
3	EZYV04	Asia	Bachelor's	N	N	
4	EZYV05	Africa	Master's	Y	N	

Categorical vs Categorical

In [3]:

```
# Column name: continent
# Output column: case_status
visa_df['continent'].value_counts()
```

Out[3]:

```
continent
Asia             16861
Europe            3732
North America     3292
South America      852
Africa             551
Oceania            192
Name: count, dtype: int64
```

In [4]:

```
# I want to know out of 16861 members how many got the visa
# we are analysing continent and case status
con1=visa_df['continent']=='Asia'
con2=visa_df['case_status']=='Certified'
con=con1&con2
len(visa_df[con])
```

Out[4]:

```
11012
```

In [5]:

```
visa_df[(visa_df['continent']=='Asia')&(visa_df['case_status']=='Certified'
```

Out[5]:

	case_id	continent	education_of_employee	has_job_experience	requires_job_trainii
1	EZYV02	Asia	Master's	Y	
5	EZYV06	Asia	Master's	Y	
6	EZYV07	Asia	Bachelor's	N	
8	EZYV09	Asia	Bachelor's	N	
10	EZYV11	Asia	Master's	N	
...	...	...	...	...	
25475	EZYV25476	Asia	Bachelor's	Y	
25476	EZYV25477	Asia	High School	Y	
25477	EZYV25478	Asia	Master's	Y	
25478	EZYV25479	Asia	Master's	Y	
25479	EZYV25480	Asia	Bachelor's	Y	

11012 rows × 12 columns

In [6]:

```
con1=visa_df['continent']=='Asia'
con2=visa_df['case_status']=='Denied'
con=con1&con2
len(visa_df[con])
```

Out[6]:

```
5849
```

In [7]:

```
con1=visa_df['continent']=='Asia'
con2=visa_df['case_status']=='Certified'
con3=visa_df['case_status']=='Denied'
cert_con=con1&con2
denied_con=con1&con3
len(visa_df[cert_con]),len(visa_df[denied_con])
print(f"{len(visa_df[cert_con])} are got the Visa from Asia")
print(f"{len(visa_df[denied_con])} are got rejected the Visa from Asia")
```

```
11012 are got the Visa from Asia
5849 are got rejected the Visa from Asia
```

In [8]:

```
labels=visa_df['continent'].value_counts().keys()
# cert
# den
for i in labels:
    con1=visa_df['continent']==i
    con2=visa_df['case_status']=='Certified'
    con3=visa_df['case_status']=='Denied'
    cert_con=con1&con2
    denied_con=con1&con3
    print(f"{len(visa_df[cert_con])} are got the Visa from {i}")
    print(f"{len(visa_df[denied_con])} are got rejected the Visa from {i}")
```

```
11012 are got the Visa from Asia
5849 are got rejected the Visa from Asia
2957 are got the Visa from Europe
775 are got rejected the Visa from Europe
2037 are got the Visa from North America
1255 are got rejected the Visa from North America
493 are got the Visa from South America
359 are got rejected the Visa from South America
397 are got the Visa from Africa
154 are got rejected the Visa from Africa
122 are got the Visa from Oceania
70 are got rejected the Visa from Oceania
```

In [9]:

```
labels=visa_df['continent'].value_counts().keys()
certified=[]
denied=[]
for i in labels:
    con1=visa_df['continent']==i
    con2=visa_df['case_status']=='Certified'
    con3=visa_df['case_status']=='Denied'
    cert_con=con1&con2
    denied_con=con1&con3
    certified.append(len(visa_df[cert_con]))
    denied.append(len(visa_df[denied_con]))

d1=pd.DataFrame(zip(labels,certified,denied),
             columns=['Continent','Certified','Denied'])
d1.set_index('Continent')
```

Out[9]:

	Certified	Denied
Continent		
Asia	11012	5849
Europe	2957	775
North America	2037	1255
South America	493	359
Africa	397	154
Oceania	122	70

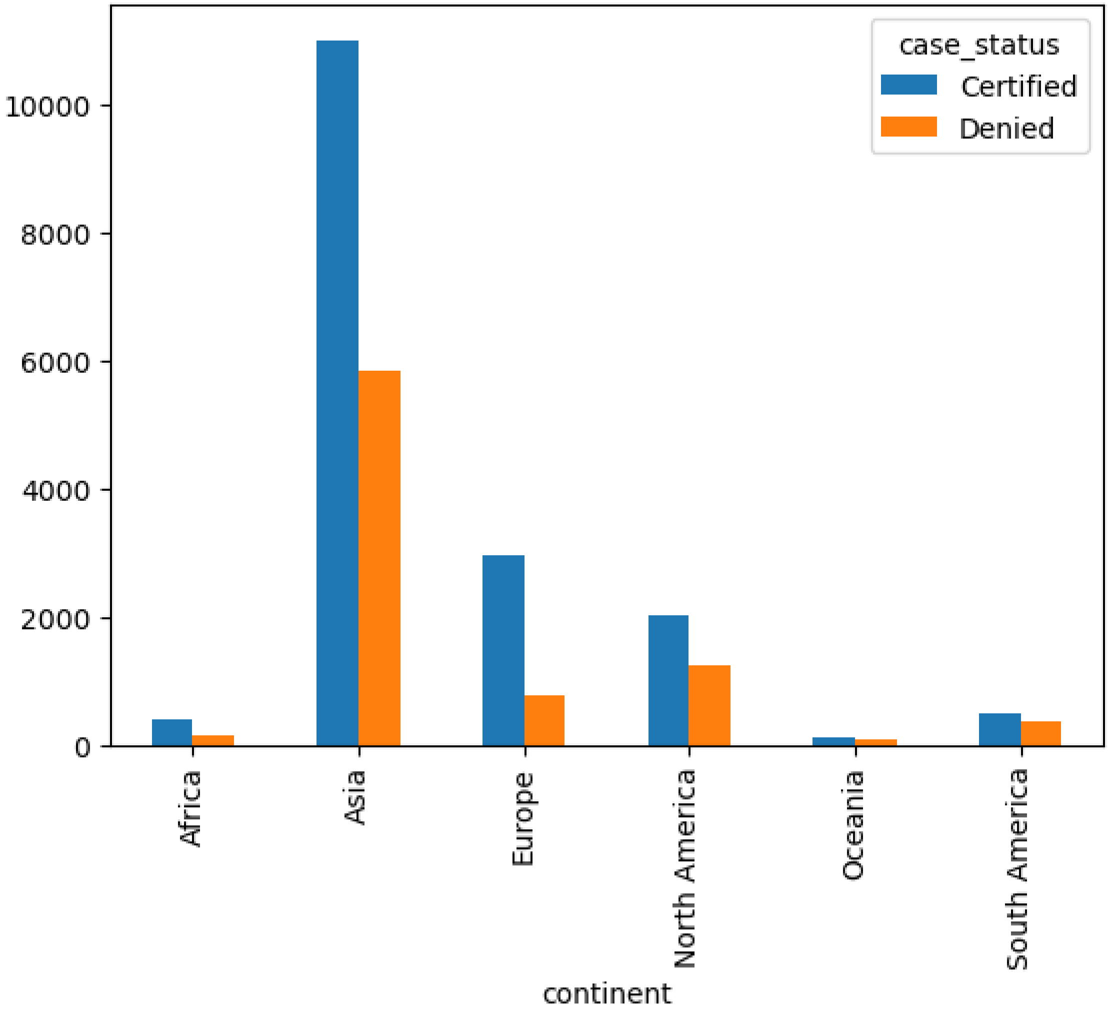
pd.crosstab

```
In [11]: col1=visa_df['continent']
         col2=visa_df['case_status']
         result1=pd.crosstab(col1,col2)
         result1
```

```
Out[11]:
     case_status  Certified  Denied
       continent
          Africa        397     154
            Asia      11012    5849
          Europe       2957     775
   North America       2037    1255
         Oceania        122      70
   South America        493     359
```

```
In [13]: result1.plot(kind='bar')
```

```
Out[13]: <Axes: xlabel='continent'>
```



```
In [ ]: # continent, education of employee and case status
```

In [14]:
```
visa_df.columns
```

Out[14]:
```
Index(['case_id', 'continent', 'education_of_employee', 'has_job_experienc
e',
       'requires_job_training', 'no_of_employees', 'yr_of_estab',
       'region_of_employment', 'prevailing_wage', 'unit_of_wage',
       'full_time_position', 'case_status'],
      dtype='object')
```

In [21]:
```
col1=visa_df['continent']
col2=[visa_df['case_status'],
      visa_df['education_of_employee']]
result2=pd.crosstab(col1,col2)
result2

# col1 is generaly index
# col2 is columns
```

Out[21]:

case_status	Certified						
education_of_employee	Bachelor's	Doctorate	High School	Master's	Bachelor's	Doctorate	Hig Scho
continent							
Africa	81	43	23	250	62	11	4
Asia	4407	780	676	5149	2761	143	161
Europe	1040	788	162	967	259	58	32
North America	641	207	210	979	584	51	19
Oceania	38	19	19	46	28	3	1
South America	160	75	74	184	173	14	6

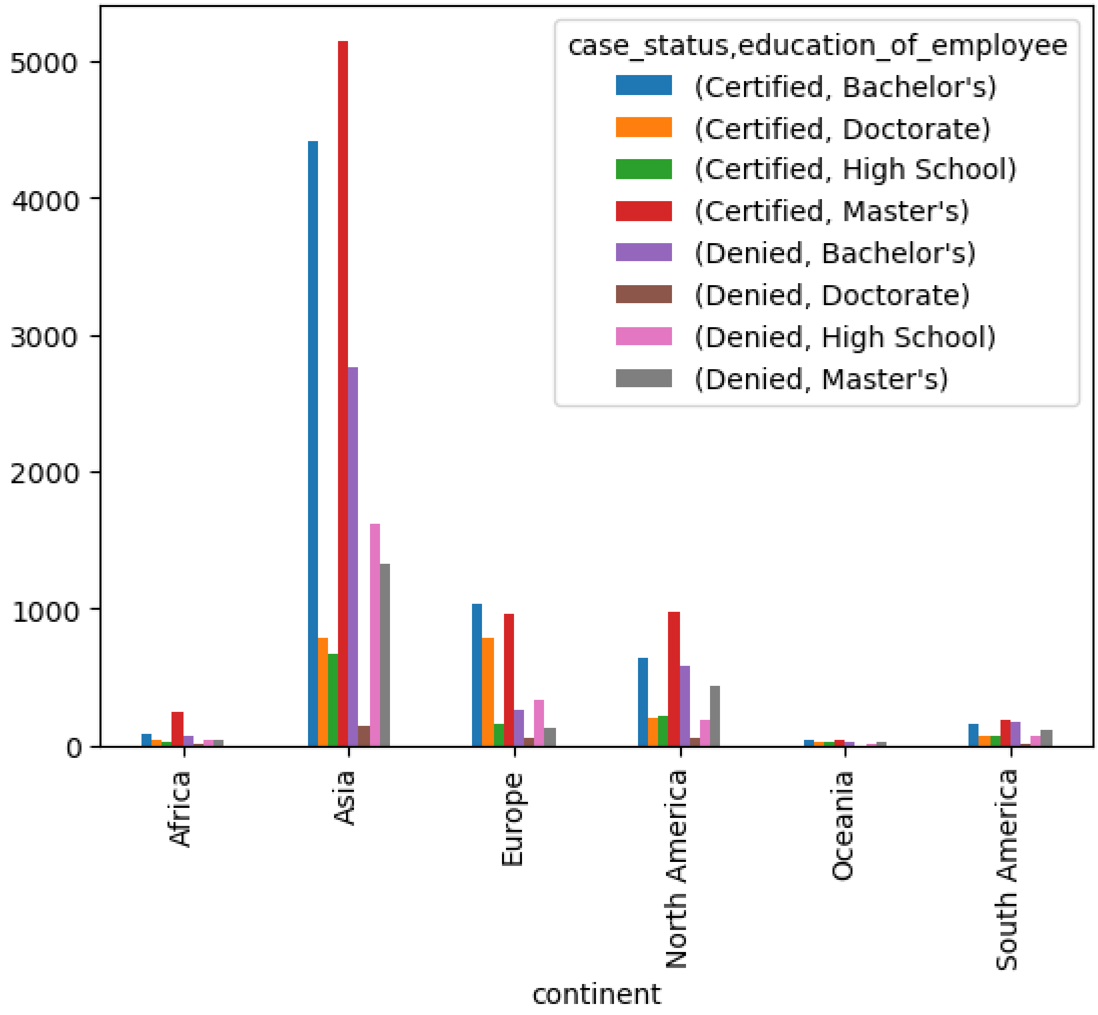
In [16]:
```
visa_df['education_of_employee'].unique()
```

Out[16]:
```
array(['High School', "Master's", "Bachelor's", 'Doctorate'], dtype=objec
t)
```

In [ ]:
```
# From Asia 16k applied for Visa
# In that  11k got the visa. 5k Rejected
# in that 11k how many HS, M,B,D
# in that 5k how many hs,M,B,D
```

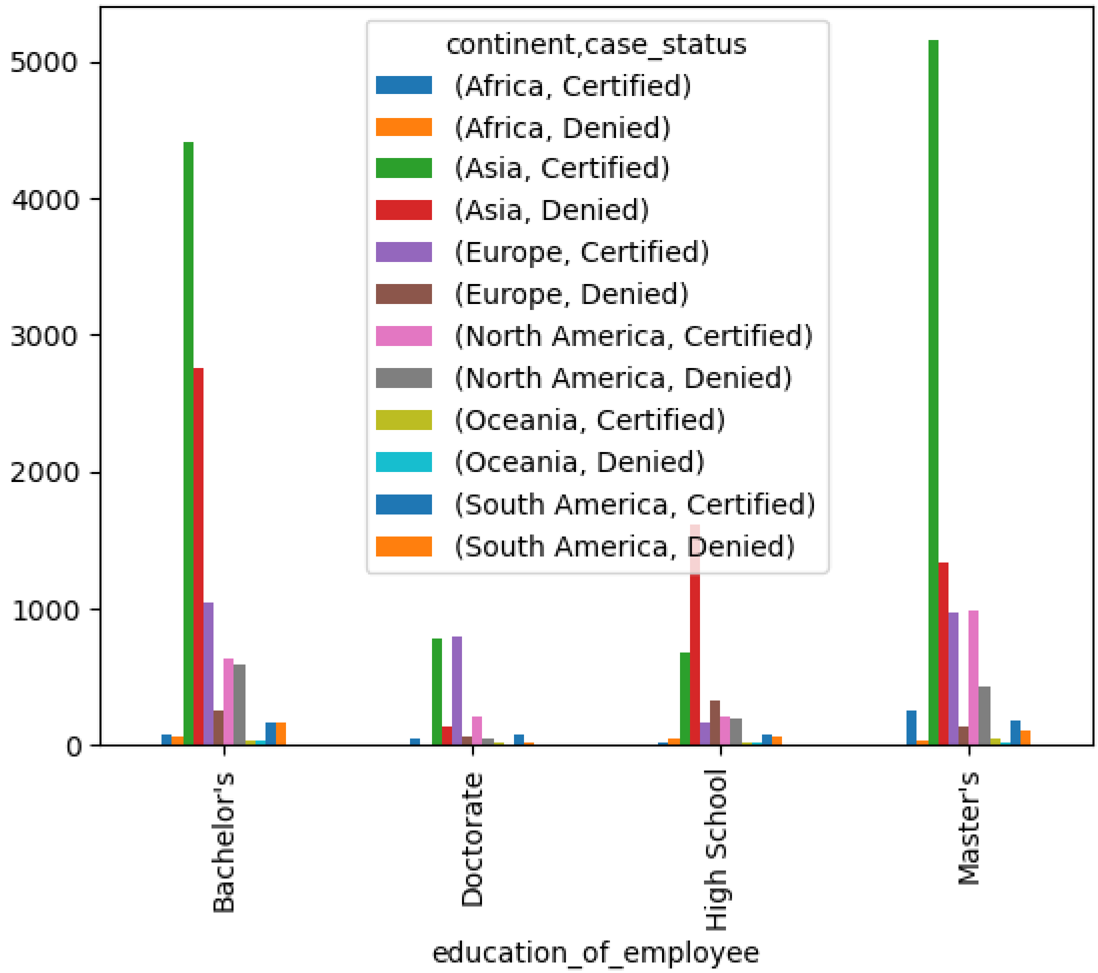
```
In [22]: result2.plot(kind='bar')

Out[22]: <Axes: xlabel='continent'>
```



```
In [23]: col1=visa_df["education_of_employee"]
         col2=[visa_df["continent"],visa_df['case_status']]
         result3=pd.crosstab(col1,col2)
         result3.plot(kind='bar')
```

```
Out[23]: <Axes: xlabel='education_of_employee'>
```



Numerical vs Numerical

Scatter-plots:

- plt.scatter
- will take two arguments x-axis and y-axis
- Both variables should be numerical
- It provides relationship between two variables
    - Positvely related
    - Negatively related
    - No relation

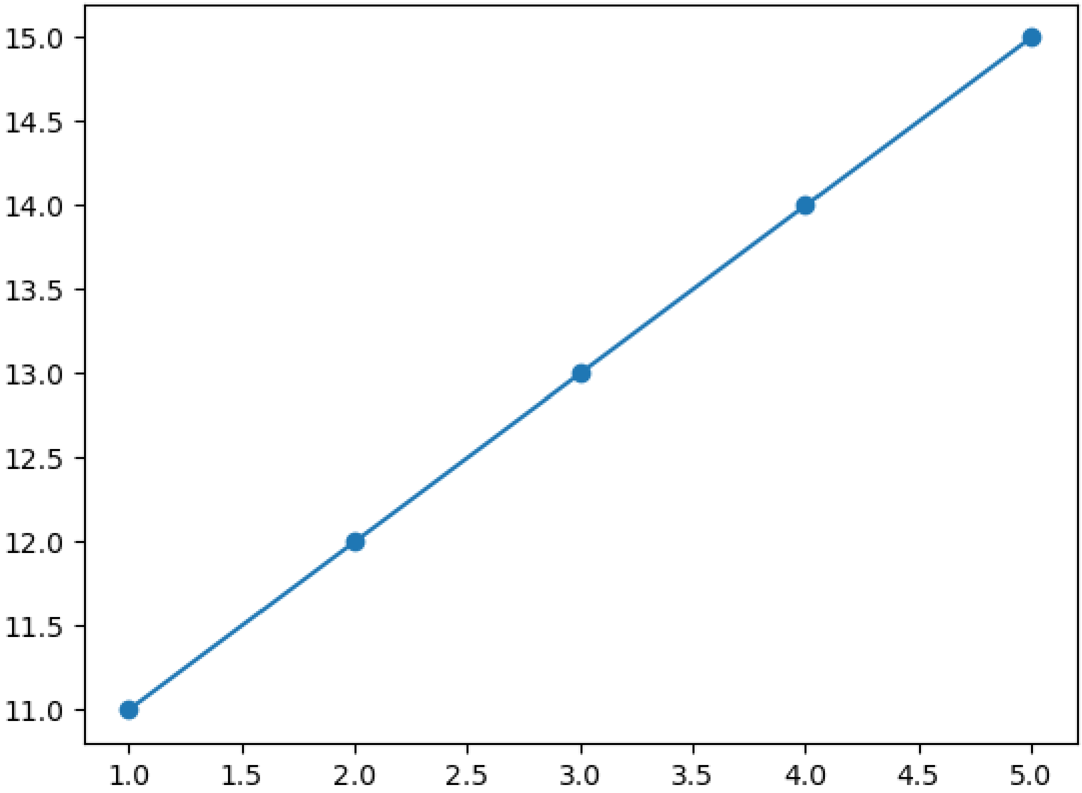
In [28]:

```
x=[1,2,3,4,5]
y=[11,12,13,14,15]

# (1,11) (2,12) (3,13) (4,14) (5,15)
plt.scatter(x,y)
plt.plot(x,y)
```

Out[28]:

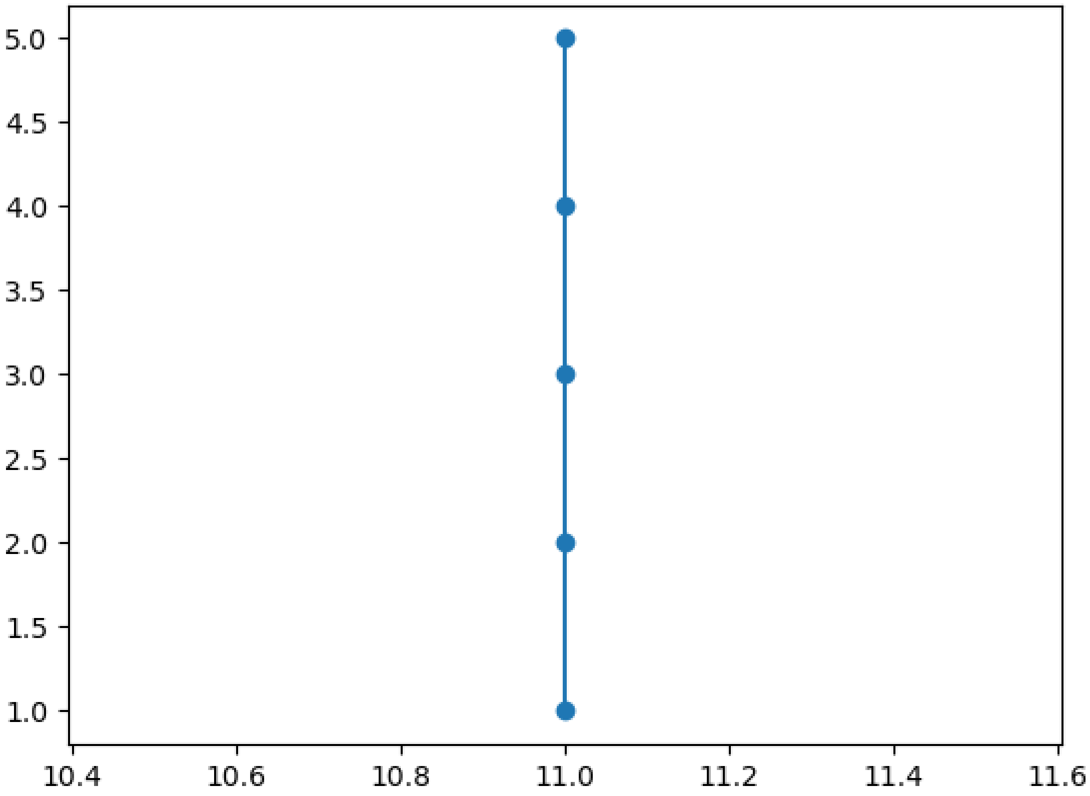
```
[<matplotlib.lines.Line2D at 0x238e67c57d0>]
```



```
In [45]: x=[1,2,3,4,5]
         y=[11,11,11,11,11]

         # (1,11) (2,12) (3,13) (4,14) (5,15)
         plt.scatter(y,x)
         plt.plot(y,x)

Out[45]: [<matplotlib.lines.Line2D at 0x238ecbc4b90>]
```

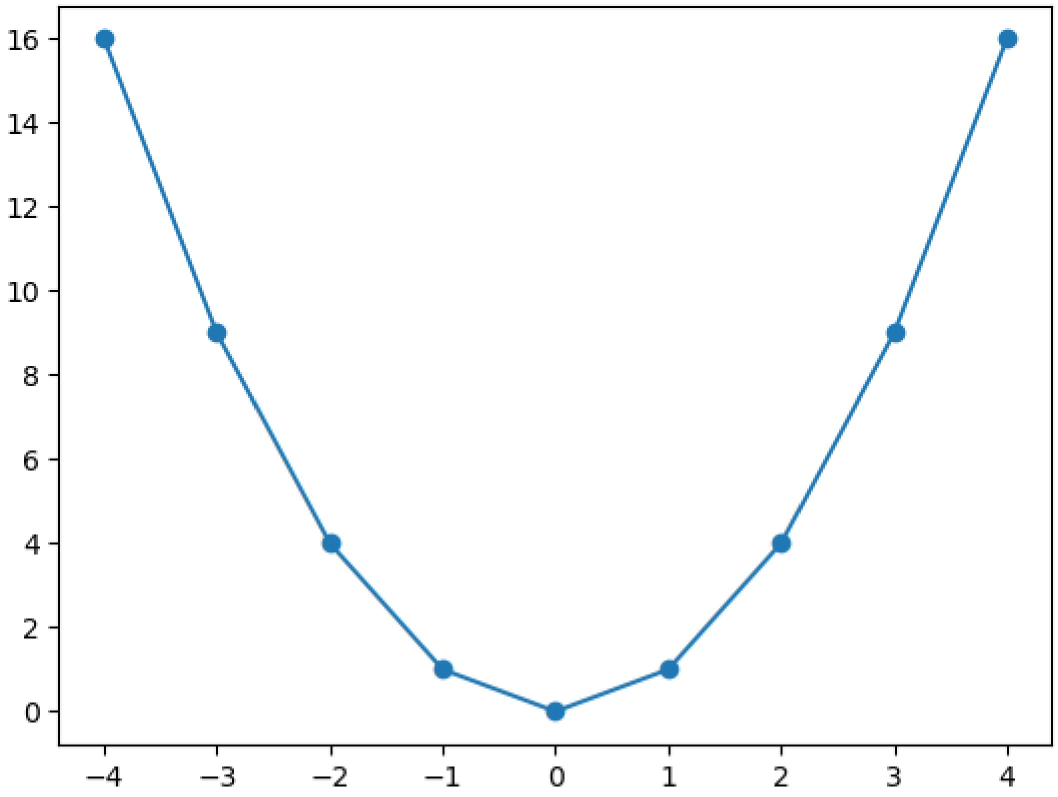


In [33]:

```
x=[i for i in range(-4,5)]
y=[i*i for i in range(-4,5)]
plt.scatter(x,y)
plt.plot(x,y)
```

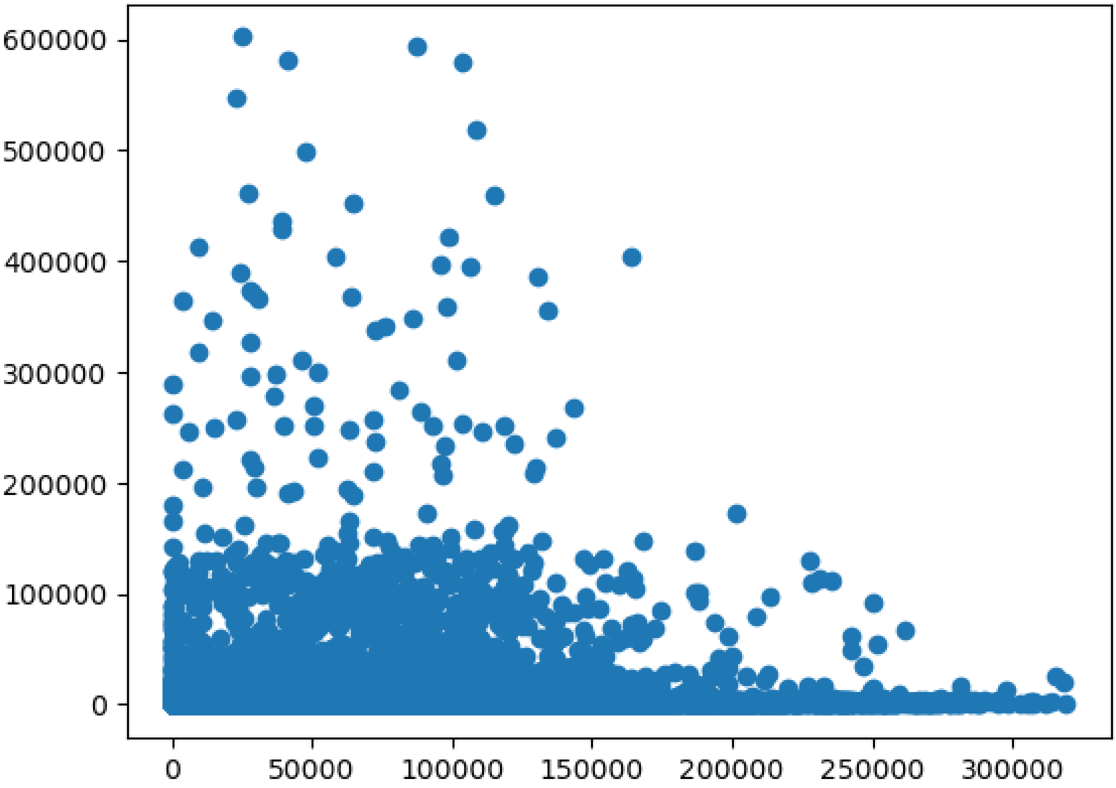
Out[33]:

```
[<matplotlib.lines.Line2D at 0x238e71adcd0>]
```



```
In [34]: # Apply scatter plot on two numerical columns from visa df
         # col1: Prevailiang wage
         # col2: Number of employees
         x=visa_df['prevailing_wage']
         y=visa_df["no_of_employees"]
         plt.scatter(x,y)
         #plt.plot(con2,con1)
```

```
Out[34]: <matplotlib.collections.PathCollection at 0x238e71bc210>
```



Correlation-Coefiecient

- Denoted with r
- Pearson correlation coefficient
- r varies from -1 to 1
- r= -1 to 0 : Negatively correlated
- r= 0 to 1: Postively Correlated
- r=0 : No relation

$$r = \frac{\sum \left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\sqrt{\sum \left(x_i - \bar{x}\right)^2 \sum \left(y_i - \bar{y}\right)^2}}$$

In [36]:

```
# visa_df is your dataframe name
visa_df.corr(numeric_only=True)

# Imagine you have 10 Columns  10*10=100
```

Out[36]:

	no_of_employees	yr_of_estab	prevailing_wage
no_of_employees	1.000000	-0.017770	-0.009523
yr_of_estab	-0.017770	1.000000	0.012342
prevailing_wage	-0.009523	0.012342	1.000000

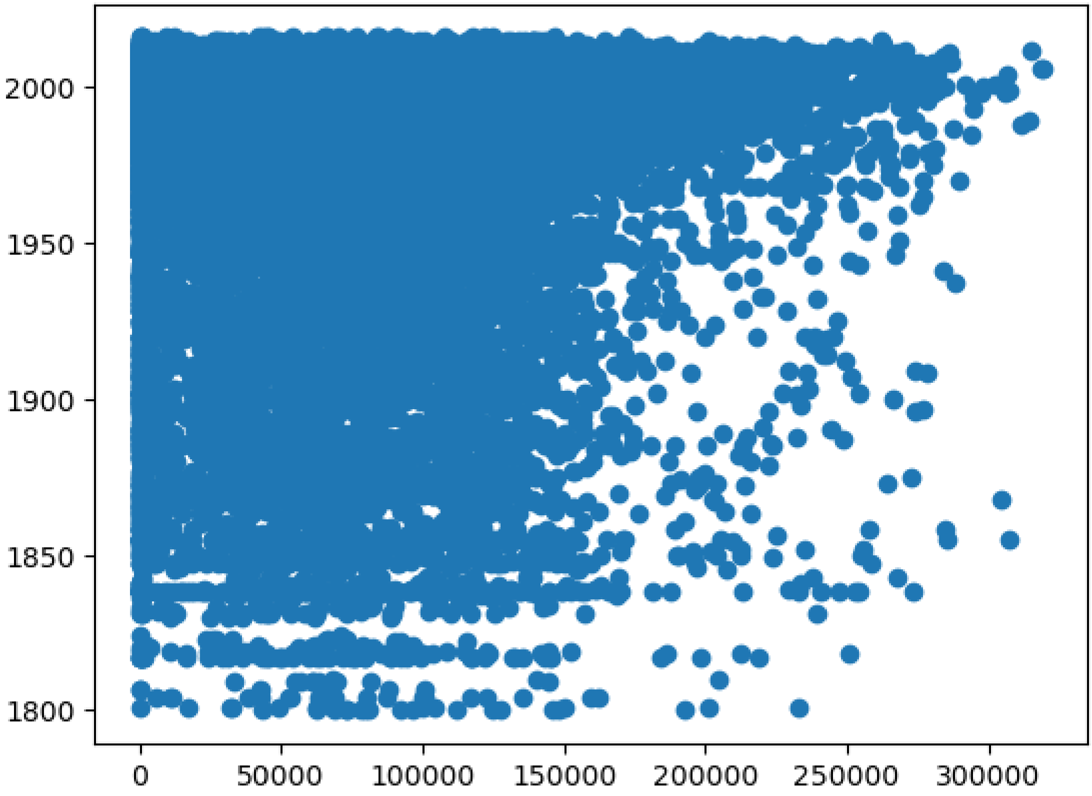
In [37]:

```
x=visa_df['prevailing_wage'] # 25480
y=visa_df["yr_of_estab"]     # 25480
plt.scatter(x,y)

(x,y)
#Sir on tha above graph how we got multiple y value on single x value??
```

Out[37]:

```
<matplotlib.collections.PathCollection at 0x238e67a4610>
```



In [38]:

```
file_location="C:\\Users\\omkar\\OneDrive\\Documents\\Data science\\Naresh I
wine_df=pd.read_csv(file_location)
wine_df.head()
```

Out[38]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alco
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	
4	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	

In [39]:

```
wine_df.corr()
```

Out[39]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	densi
fixed acidity	1.000000	-0.256131	0.671703	0.114777	0.093705	-0.153794	-0.113181	0.6680
volatile acidity	-0.256131	1.000000	-0.552496	0.001918	0.061298	-0.010504	0.076470	0.0220
citric acid	0.671703	-0.552496	1.000000	0.143577	0.203823	-0.060978	0.035533	0.3649
residual sugar	0.114777	0.001918	0.143577	1.000000	0.055610	0.187049	0.203028	0.3552
chlorides	0.093705	0.061298	0.203823	0.055610	1.000000	0.005562	0.047400	0.2006
free sulfur dioxide	-0.153794	-0.010504	-0.060978	0.187049	0.005562	1.000000	0.667666	-0.0219
total sulfur dioxide	-0.113181	0.076470	0.035533	0.203028	0.047400	0.667666	1.000000	0.0712
density	0.668047	0.022026	0.364947	0.355283	0.200632	-0.021946	0.071269	1.0000
pH	-0.682978	0.234937	-0.541904	-0.085652	-0.265026	0.070377	-0.066495	-0.3416
sulphates	0.183006	-0.260987	0.312770	0.005527	0.371260	0.051658	0.042947	0.1485
alcohol	-0.061668	-0.202288	0.109903	0.042075	-0.221141	-0.069408	-0.205654	-0.4961
quality	0.124052	-0.390558	0.226373	0.013732	-0.128907	-0.050656	-0.185100	-0.1749

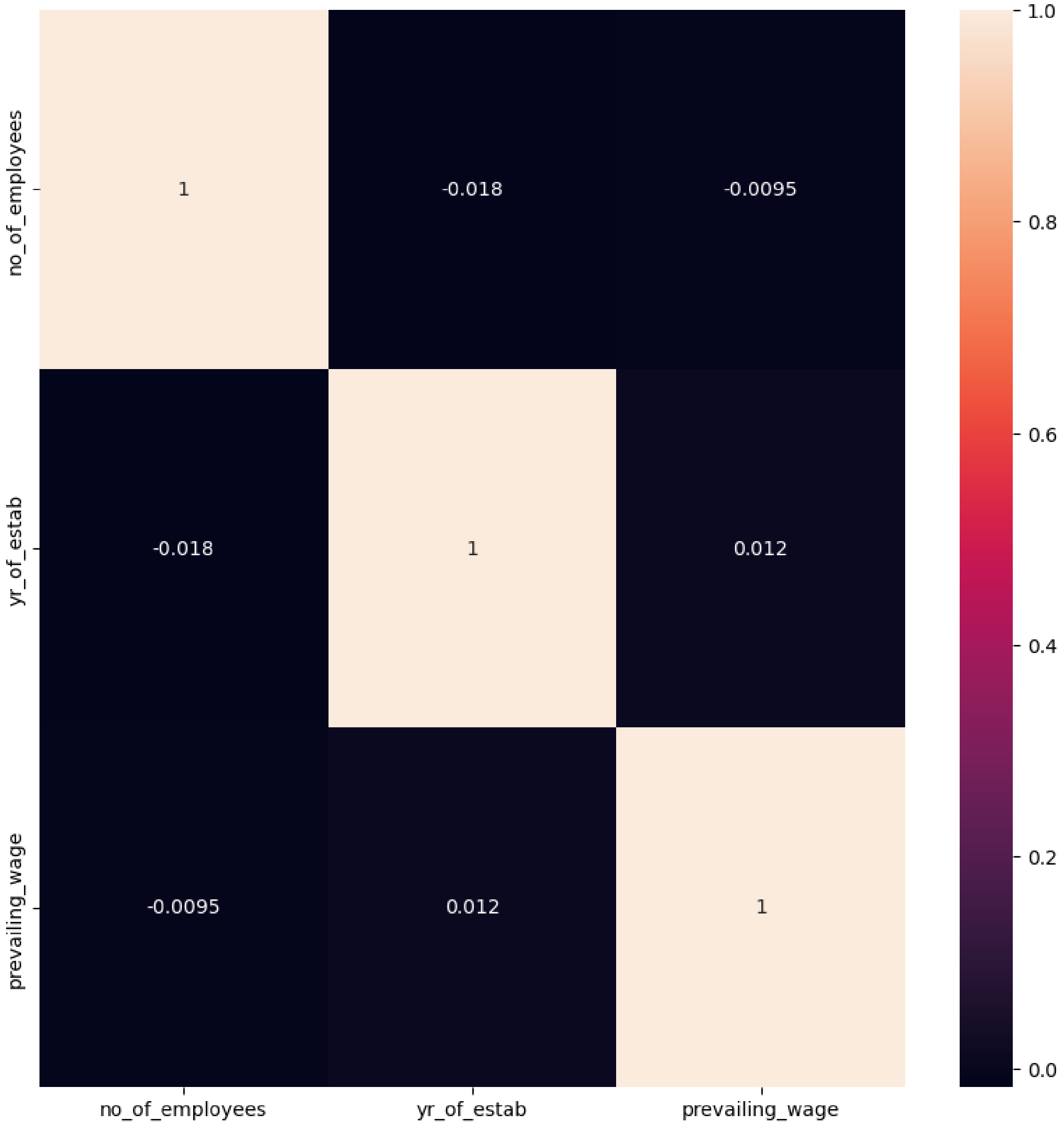
Heatmap

In [41]:

```
#sns.heatmap(<cov matrix>)
# heatmap avialable from seaborn package
# In this partcular visadf correlation
# Line your right side min=0  max=1
# entrire matrix value ranges  0 to 1
```

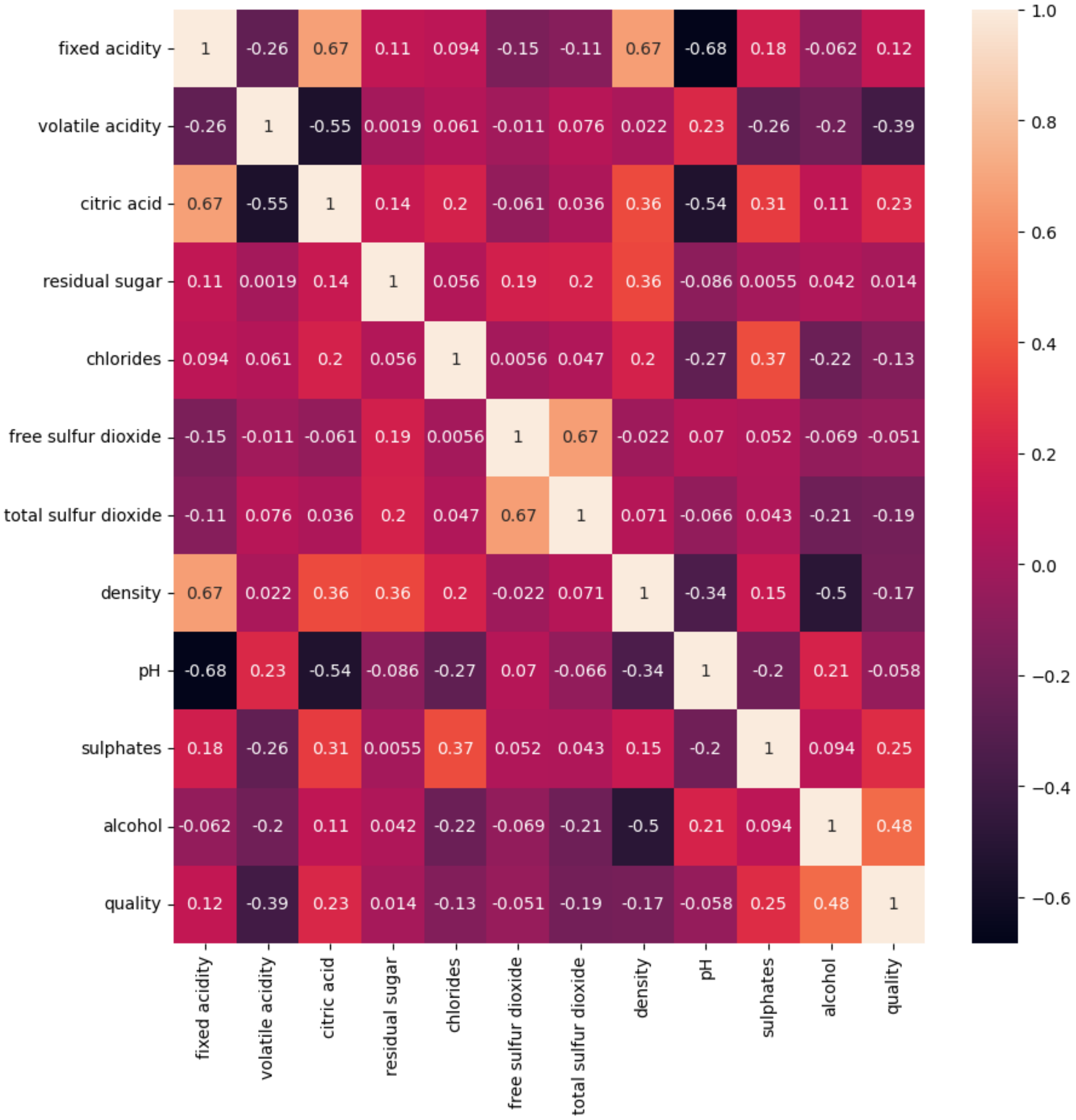
In [51]:
```
plt.figure(figsize=(10,10))
corr=visa_df.corr(numeric_only=True)
sns.heatmap(corr,annot=True)
```

Out[51]:
```
<Axes: >
```



```
In [48]: plt.figure(figsize=(10,10))
         corr=wine_df.corr(numeric_only=True)
         sns.heatmap(corr,annot=True)
```

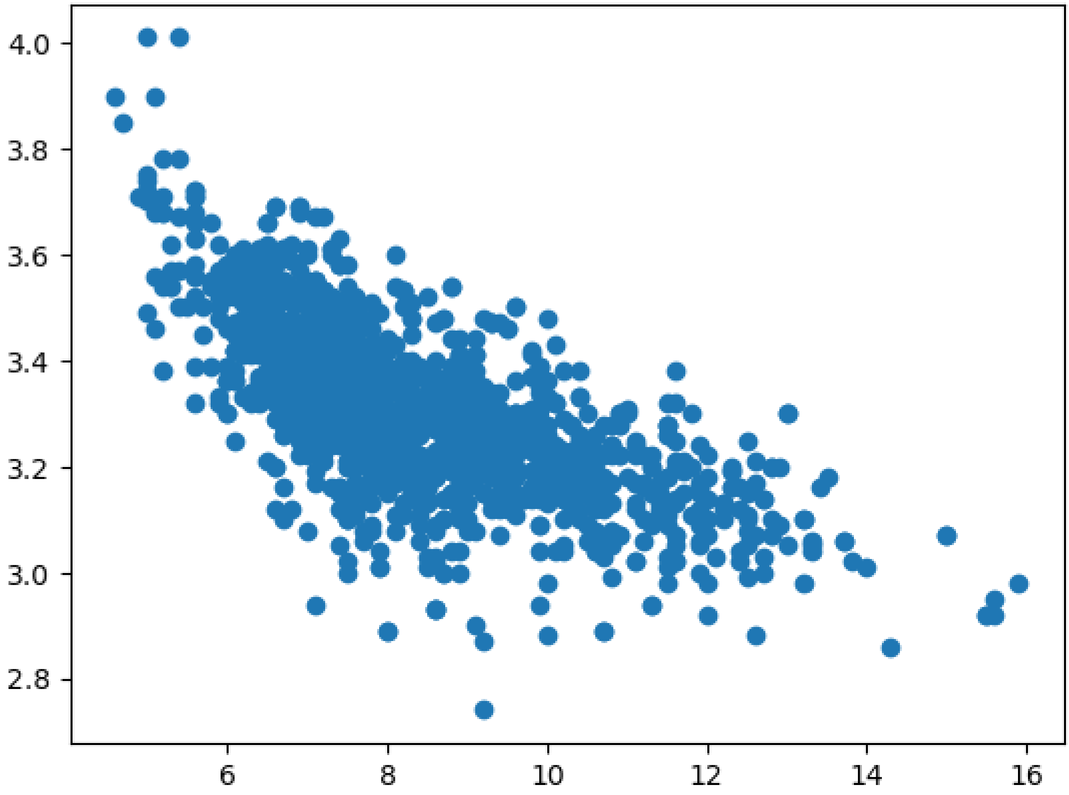
```
Out[48]: <Axes: >
```



	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
fixed acidity	1	-0.26	0.67	0.11	0.094	-0.15	-0.11	0.67	-0.68	0.18	-0.062	0.12
volatile acidity	-0.26	1	-0.55	0.0019	0.061	-0.011	0.076	0.022	0.23	-0.26	-0.2	-0.39
citric acid	0.67	-0.55	1	0.14	0.2	-0.061	0.036	0.36	-0.54	0.31	0.11	0.23
residual sugar	0.11	0.0019	0.14	1	0.056	0.19	0.2	0.36	-0.086	0.0055	0.042	0.014
chlorides	0.094	0.061	0.2	0.056	1	0.0056	0.047	0.2	-0.27	0.37	-0.22	-0.13
free sulfur dioxide	-0.15	-0.011	-0.061	0.19	0.0056	1	0.67	-0.022	0.07	0.052	-0.069	-0.051
total sulfur dioxide	-0.11	0.076	0.036	0.2	0.047	0.67	1	0.071	-0.066	0.043	-0.21	-0.19
density	0.67	0.022	0.36	0.36	0.2	-0.022	0.071	1	-0.34	0.15	-0.5	-0.17
pH	-0.68	0.23	-0.54	-0.086	-0.27	0.07	-0.066	-0.34	1	-0.2	0.21	-0.058
sulphates	0.18	-0.26	0.31	0.0055	0.37	0.052	0.043	0.15	-0.2	1	0.094	0.25
alcohol	-0.062	-0.2	0.11	0.042	-0.22	-0.069	-0.21	-0.5	0.21	0.094	1	0.48
quality	0.12	-0.39	0.23	0.014	-0.13	-0.051	-0.19	-0.17	-0.058	0.25	0.48	1

```
In [50]: plt.scatter(wine_df['fixed acidity'],wine_df['pH'])
```

```
Out[50]: <matplotlib.collections.PathCollection at 0x238ed597550>
```



EDA-Session1

- We just read the data
- How to create data frames using list and dict
- How to add new column
- How to add new rows
- How to drop columns and rows
- How to change the index
- How to save the data frame local

EDA-Session2:

- We read the data
- shape,size,len,head,tail
- columns,dtypes,info
- Seperated Cat and num columns

EDA-Session3: Categorical column analysis

- We read one categorical column
- Unique and nunique
- Value counts
- Frequency table
- bar plot and Pie chart

EDA-Session4: Numerical column analysis

- We read one Numerical column
- We calculate all statistical measurements
  - Mean
  - Median
  - count
  - std
  - max min
  - 25p 50p 75p
- Histogram
- Distribution plots
- Box plot for outliers

EDA-Session5: Outlier analysis

- We read one Numerical column
- We plot the boxlot
- Perform the outlier analysis
- Impute the outliers using medain value
- np.where

EDA-Session6: Bi variate and Multi variate analysis

- Categorical vs Categorical
  - pd.cross tab
  - plot the results
- Numerical vs Numerical
  - Relation ship between variables
  - Scatter plot
  - Correlation
  - heatmap

In [ ]: