

# Software Engineering Tools Lab

## Assignment No. 2

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### 1. List of Frameworks/IDEs/Softwares.

**For every Frameworks/IDEs/Softwares given above provide the answers for below questions**

**Ans:**

#### 1)Android SDK:

Original author: Google

Developers: Google

Initial release: 2008

Stable release: v14.0.2, 2021

Preview release: n/a

Repository: <https://developer.android.com/studio>

Written in: Java, C++

Operating System support: Windows, macOS, Linux

Platform, portability: Android

Available in (Total languages): n/a

List of languages supported: Java, C++

Type: Integrated Development Environment (IDE) for Android app development

Website: <https://developer.android.com/studio>

Features: Integrated development environment for Android app development, includes emulator for testing, layout editor, code editor, debugging tools, and more.

Size (in MB, GB etc.): ~1.5 GB

Privacy and Security: n/a

Type of software (Open source/License): Open source

If License- Provide details: Apache License 2.0

Latest version: v14.0.2, 2021

Cloud support (Yes/No): No

Applicability: Android app development

Drawbacks (if any): n/a

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## **2)Eclipse:**

Original author: IBM

Developers: The Eclipse Foundation

Initial release: 2001

Stable release: Eclipse 4.18, 2021

Preview release: n/a

Repository: <https://github.com/eclipse>

Written in: Java, C++

Operating System support: Windows, macOS, Linux

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: Java, C++, Python, PHP, and more.

Type: Integrated Development Environment (IDE)

Website: <https://eclipse.org/>

Features: Integrated development environment with code editing, debugging, and testing tools, supports multiple programming languages and can be extended with plugins.

Size (in MB, GB etc.): ~400 MB

Privacy and Security: n/a

Type of software (Open source/License): Open source

If License- Provide details: Eclipse Public License

Latest version: Eclipse 4.18, 2021

Cloud support (Yes/No): No

Applicability: Cross-platform development for multiple programming languages

Drawbacks (if any): Can be slow and resource-intensive, and the choice of plugins can greatly impact the user experience.

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### **3)Node JS:**

Original author: Ryan Dahl

Developers: Node.js Foundation

Initial release: 2009

Stable release: Node.js 15.9.0, 2021

Preview release: n/a

Repository: <https://github.com/nodejs/node>

Written in: C++, JavaScript

Operating System support: Windows, macOS, Linux

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: JavaScript

Type: Server-side JavaScript runtime environment

Website: <https://nodejs.org/>

Features: Event-driven, non-blocking I/O model, single-threaded with multiple processes, built-in modules for various tasks, fast and efficient for network and I/O-bound applications.

Size (in MB, GB etc.): ~30 MB

Privacy and Security: Node.js is continuously being updated to address potential security issues.

Type of software (Open source/License): Open source

If License- Provide details: MIT License

Latest version: Node.js 15.9.0, 2021

Cloud support (Yes/No): Yes

Applicability: Server-side JavaScript runtime environment, suitable for building fast, scalable network and I/O-bound applications.

Drawbacks (if any): Not well-suited for CPU-bound or intensive computation tasks.

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#### **4)DotNet:**

Original author: Microsoft

Developers: Microsoft

Initial release: 2002

Stable release: .NET 6.0, 2021

Preview release: n/a

Repository: <https://github.com/dotnet>

Written in: C#, F#, VB.NET, and other .NET languages

Operating System support: Windows, macOS, Linux

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: C#, F#, VB.NET, and other .NET languages

Type: Software framework

Website: <https://dotnet.microsoft.com/>

Features: Comprehensive software framework for building modern applications, supports multiple programming languages, includes libraries for various tasks, runtime for executing .NET code, and tools for development and deployment.

Size (in MB, GB etc.): n/a

Privacy and Security: Microsoft implements security measures and releases security updates to address potential security vulnerabilities.

Type of software (Open source/License): Open source

If License- Provide details: MIT License, .NET Core is open-source, .NET Framework is proprietary

Latest version: .NET 6.0, 2021

Cloud support (Yes/No): Yes

Applicability: Building modern applications for various platforms, including web, desktop, cloud, gaming, IoT, and AI.

Drawbacks (if any): The proprietary .NET Framework can limit freedom and flexibility, and requires a Microsoft-supported operating system.

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## **5)Ruby on Rails:**

Original author: David Heinemeier Hansson

Developers: Ruby on Rails Core Team, open-source community

Initial release: 2004

Stable release: Rails 6.1.4, 2021

Preview release: n/a

Repository: <https://github.com/rails/rails>

Written in: Ruby

Operating System support: Windows, macOS, Linux

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: Ruby

Type: Web application framework

Website: <https://rubyonrails.org/>

Features: Rapid development, convention over configuration, built-in support for common web development tasks, modular and reusable code, large and supportive community.

Size (in MB, GB etc.): n/a

Privacy and Security: Rails is continuously being updated to address potential security issues, and there are various resources available for securing a Rails application.

Type of software (Open source/License): Open source

If License- Provide details: MIT License

Latest version: Rails 6.1.4, 2021

Cloud support (Yes/No): Yes

Applicability: Building web applications quickly and efficiently, especially for MVPs and prototyping.

Drawbacks (if any): Can have a steeper learning curve compared to other frameworks, performance may not be optimal for very large or resource-intensive applications.

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## **6)Anaconda:**

Original author: Continuum Analytics

Developers: Anaconda, Inc.

Initial release: 2012

Stable release: Anaconda Navigator 1.21.0, 2021

Preview release: n/a

Repository: <https://github.com/anaconda-platform>

Written in: Python

Operating System support: Windows, macOS, Linux

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: Python

Type: Data science and machine learning platform

Website: <https://www.anaconda.com/>

Features: Distribution of popular Python packages, package and environment management, integrated development environment (IDE) for data science and machine learning workflows, Jupyter Notebook support.

Size (in MB, GB etc.): Approximately 2 GB for the full installation

Privacy and Security: Anaconda implements security measures to ensure the privacy and security of users' data and information.

Type of software (Open source/License): Open source and commercial license

If License- Provide details: Anaconda Navigator is open-source and free, while Anaconda Enterprise includes commercial licenses and additional features.

Latest version: Anaconda Navigator 1.21.0, 2021

Cloud support (Yes/No): Yes

Applicability: Data science and machine learning, scientific computing, and data analysis.

Drawbacks (if any): Can be resource-intensive, limited commercial support for open-source version, some packages may not be available.

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## **7)Google Colab:**

Original author: Continuum Analytics

Developers: Anaconda, Inc.

Initial release: 2012

Stable release: Anaconda Navigator 1.21.0, 2021

Preview release: n/a

Repository: <https://github.com/anaconda-platform>

Written in: Python

Operating System support: Windows, macOS, Linux

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: Python

Type: Data science and machine learning platform

Website: <https://www.anaconda.com/>

Features: Distribution of popular Python packages, package and environment management, integrated development environment (IDE) for data science and machine learning workflows, Jupyter Notebook support.

Size (in MB, GB etc.): Approximately 2 GB for the full installation

Privacy and Security: Anaconda implements security measures to ensure the privacy and security of users' data and information.

Type of software (Open source/License): Open source and commercial license

If License- Provide details: Anaconda Navigator is open-source and free, while Anaconda Enterprise includes commercial licenses and additional features.

Latest version: Anaconda Navigator 1.21.0, 2021

Cloud support (Yes/No): Yes

Applicability: Data science and machine learning, scientific computing, and data analysis.

Drawbacks (if any): Can be resource-intensive, limited commercial support for open-source version, some packages may not be available.

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## **8) Django:**

Original author: Adrian Holovaty and Simon Willison

Developers: Django Software Foundation

Initial release: 2005

Stable release: Django 4.2, January 2021

Preview release: n/a

Repository: <https://github.com/django/django>



Written in: Python

Operating System support: Cross-platform

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: n/a

Type: High-level Python Web framework

Website: <https://www.djangoproject.com/>

Features: Object-relational mapping (ORM), support for multiple database backends, URL routing, template engine, security features, built-in administration interface.

Size (in MB, GB etc.): Approximately 20 MB

Privacy and Security: Django implements security measures to ensure the privacy and security of users' data and information.

Type of software (Open source/License): Open source

If License- Provide details: Django is open-source software released under the BSD license.

Latest version: Django 4.2, January 2021

Cloud support (Yes/No): Yes, can be deployed on cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).

Applicability: Web development, content management systems (CMS), e-commerce sites.

Drawbacks (if any): Steep learning curve, poor performance for large scale sites without optimization, less flexible compared to other web frameworks.

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## **9)Vue.js:**

Original author: Evan You

Developers: Evan You, Vue.js Core Team, and Community Contributors

Initial release: February 2014

Stable release: Vue.js 3.6.3, February 2021

Preview release: n/a

Repository: <https://github.com/vuejs/vue>

Written in: JavaScript

Operating System support: Cross-platform

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: n/a

Type: Progressive JavaScript Framework

Website: <https://vuejs.org/>

Features: Reactive data binding, component-based architecture, virtual DOM, reactivity system, Vue CLI for quick project scaffolding.

Size (in MB, GB etc.): Approximately 20-30 KB gzipped

Privacy and Security: Vue.js has security measures to ensure the privacy and security of users' data and information.

Type of software (Open source/License): Open source

If License- Provide details: Vue.js is open-source software released under the MIT License.

Latest version: Vue.js 3.6.3, February 2021

Cloud support (Yes/No): Yes, can be deployed on cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).

Applicability: User interface components, single-page applications, progressive web apps (PWAs).

Drawbacks (if any): Steep learning curve compared to other JavaScript frameworks, limited resources and support compared to other popular frameworks like React and Angular.

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## **10)GitHub:**

Original author: Chris Wanstrath, PJ Hyett, Tom Preston-Werner

Developers: GitHub, Inc. and Community Contributors

Initial release: February 2008

Stable release: n/a

Preview release: n/a

Repository: <https://github.com/github>

Written in: Ruby, Go, JavaScript, HTML, CSS, and others

Operating System support: Cross-platform

Platform, portability: Cross-platform

Available in (Total languages): n/a

List of languages supported: n/a

Type: Web-based Git repository hosting service

Website: <https://github.com/>

Features: Source code management, issue tracking, pull request, project management, wikis, documentation, and collaboration.

Size (in MB, GB etc.): n/a

Privacy and Security: GitHub implements security measures to ensure the privacy and security of its users' data and information.

Type of software (Open source/License): Open source and proprietary

If License- Provide details: GitHub offers both free and paid plans, with proprietary features available on its paid plans.

Latest version: n/a

Cloud support (Yes/No): Yes, GitHub is a cloud-based platform.

Applicability: Software development, version control, collaboration, and project management.

Drawbacks (if any): Limited features for free users, proprietary features only available on paid plans, large user base may cause slowdown during peak usage times.

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## **11)React:**

Original author: Jordan Walke

Developers: Facebook, Inc. and Community Contributors

Initial release: March 2013

Stable release: n/a

Preview release: n/a

Repository: <https://github.com/facebook/react>

Written in: JavaScript

Operating System support: Cross-platform

Platform, portability: Cross-platform

Available in (Total languages): 1 (JavaScript)

List of languages supported: JavaScript

Type: JavaScript library for building user interfaces

Website: <https://reactjs.org/>

Features: Component-based architecture, virtual DOM, server-side rendering, reactive data updates, and easy integration with other libraries and tools.

Size (in MB, GB etc.): Approximately 20 KB (minified and gzipped)

Privacy and Security: React implements security measures to ensure the privacy and security of its users' data and information.

Type of software (Open source/License): Open source (MIT License)

If License- Provide details: React is released under the MIT License, which is a permissive open-source license that allows for commercial and non-commercial use.

Latest version: 17.0.2 (as of 2021-09)

Cloud support (Yes/No): No, React is a client-side library.

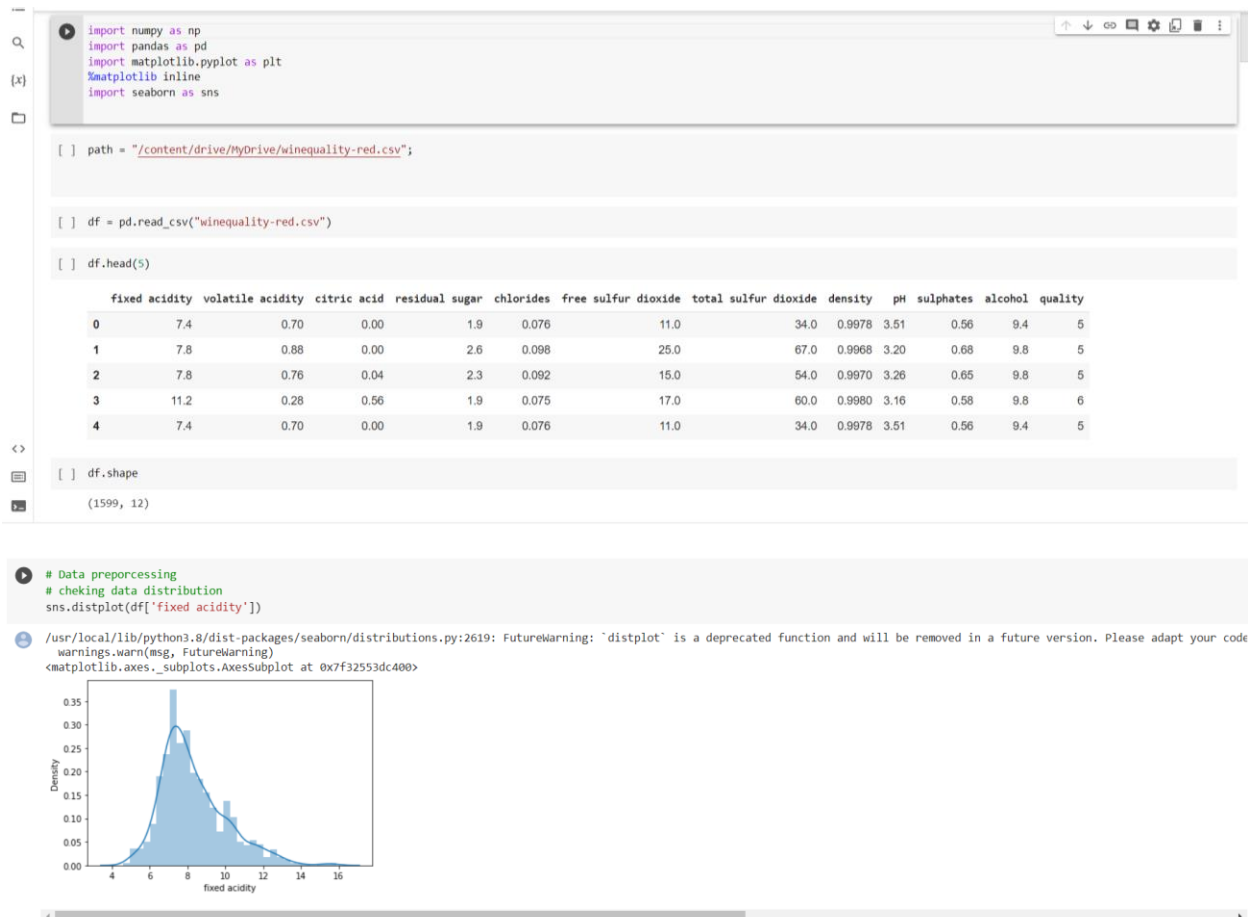
Applicability: Building user interfaces for web and mobile applications.

Drawbacks (if any): Steep learning curve for new users, can be complex for large and complex applications, may require additional tools and libraries for advanced features.

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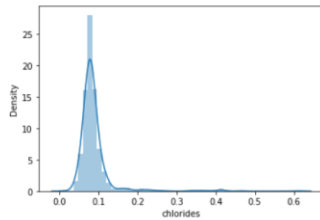
## 2. Implement linear regression problem using Google Collab (Perform preprocessing, training and testing)

Dataset used: <https://www.kaggle.com/datasets/uciml/red-wine-quality-cortez-et-al-2009>



```
sns.distplot(df['chlorides'])
```

```
/usr/local/lib/python3.8/dist-packages/seaborn/distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please adapt your code to warnings.warn(msg, FutureWarning)
<matplotlib.axes._subplots.AxesSubplot at 0x7f32532a7cd0>
```

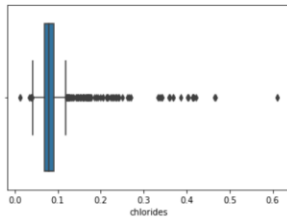


```
[ ] # checking null value
df[df.isnull()].count()
```

```
fixed acidity      0
volatile acidity   0
citric acid        0
residual sugar     0
chlorides          0
free sulfur dioxide 0
total sulfur dioxide 0
density           0
pH                0
sulphates         0
alcohol           0
quality           0
dtype: int64
```

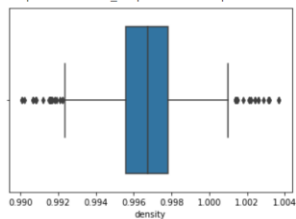
```
# checking outliers
sns.boxplot(df['chlorides'])
```

```
/usr/local/lib/python3.8/dist-packages/seaborn/_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be data.
warnings.warn(
<matplotlib.axes._subplots.AxesSubplot at 0x7f325d5b640>
```



```
sns.boxplot(df['density'])
```

```
/usr/local/lib/python3.8/dist-packages/seaborn/_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be data.
warnings.warn(
<matplotlib.axes._subplots.AxesSubplot at 0x7f328c0abc70>
```



```
# removing outliers by Zscore method Z = x-mean/SD
from scipy import stats
z = np.abs(stats.zscore(df))
```

```
[ ] print(z)
```

```
fixed acidity volatile acidity citric acid residual sugar chlorides \
0 0.528360 0.961877 1.391472 0.453218 0.243707
1 0.298547 1.967442 1.391472 0.043416 0.223875
2 0.298547 1.297065 1.186070 0.169427 0.096353
3 1.654856 1.384443 1.484154 0.453218 0.264960
4 0.528360 0.961877 1.391472 0.453218 0.243707
...
1594 1.217796 0.403229 0.980669 0.382271 0.053845
1595 1.390155 0.123905 0.877968 0.240375 0.541259
1596 1.160343 0.099554 0.723916 0.169427 0.243707
1597 1.390155 0.654620 0.775267 0.382271 0.264960
1598 1.332702 1.216849 1.021999 0.752894 0.434990

free sulfur dioxide total sulfur dioxide density pH \
0 0.466193 0.379133 0.558274 1.288643
1 0.872638 0.624363 0.028261 0.719933
2 0.083669 0.229047 0.134264 0.331177
3 0.107592 0.411500 0.664277 0.979104
4 0.466193 0.379133 0.558274 1.288643
...
1594 1.542054 0.075043 0.978765 0.899886
1595 2.211469 0.137820 0.862162 1.353436
1596 1.255161 0.196679 0.533554 0.705508
1597 1.542054 0.075043 0.676657 1.677400
1598 0.203223 0.135861 0.666057 0.511130

sulphates alcohol quality
0 0.579207 0.960246 0.787823
1 0.128950 0.584777 0.787823
2 0.048089 0.584777 0.787823
3 0.461180 0.584777 0.450848
4 0.579207 0.960246 0.787823
...
1594 0.461180 0.072294 0.787823
1595 0.601055 0.729364 0.450848
1596 0.542042 0.541630 0.450848
1597 0.305990 0.209308 0.787823
1598 0.010924 0.541630 0.450848
```

```
[1599 rows x 12 columns]
```

```
threshold = 3
print(np.where(z>3))
```

```
(array([ 13, 14, 15, 15, 17, 17, 19, 33, 38, 42, 43,
        45, 57, 81, 81, 83, 86, 88, 91, 92, 95, 106,
        106, 109, 120, 126, 127, 142, 144, 147, 151, 151, 151,
        151, 163, 164, 169, 169, 181, 199, 226, 226, 240, 243,
        244, 258, 258, 274, 281, 291, 324, 325, 339, 340, 347,
        354, 374, 381, 391, 396, 396, 400, 400, 442, 442, 451,
        459, 467, 480, 480, 494, 515, 517, 544, 554, 554, 555,
        555, 557, 557, 568, 584, 588, 591, 595, 608, 614, 636,
        639, 649, 649, 651, 652, 652, 672, 672, 684, 690,
        698, 692, 692, 695, 723, 724, 730, 754, 776, 777, 795,
        821, 832, 836, 837, 889, 899, 911, 917, 923, 925, 926,
        982, 1017, 1018, 1043, 1051, 1051, 1071, 1074, 1079, 1079, 1081,
        1081, 1111, 1114, 1131, 1154, 1165, 1175, 1186, 1231, 1235, 1244,
        1244, 1244, 1260, 1269, 1269, 1270, 1270, 1288, 1289, 1295, 1296,
        1299, 1299, 1300, 1312, 1316, 1319, 1319, 1321, 1358, 1367, 1370,
        1370, 1372, 1372, 1374, 1374, 1434, 1434, 1434, 1435, 1435, 1435,
        1469, 1474, 1474, 1474, 1476, 1476, 1476, 1478, 1493, 1496, 1505,
        1558, 1558, 1570, 1574, 1589]), array([ 9, 5, 5, 6, 4, 9, 4, 3, 1, 4, 9, 8, 5, 4, 9, 4, 9,
        9, 9, 9, 8, 4, 9, 6, 1, 1, 1, 10, 10, 4, 2, 4, 8, 9,
        3, 3, 4, 9, 4, 1, 4, 9, 4, 0, 0, 4, 9, 3, 4, 4, 3,
        3, 9, 9, 0, 6, 0, 0, 3, 5, 3, 5, 0, 7, 4, 11, 10,
        3, 7, 3, 6, 11, 0, 0, 7, 0, 7, 0, 7, 4, 5, 10, 6, 3,
        7, 9, 6, 9, 3, 6, 6, 0, 3, 10, 1, 6, 6, 1, 11, 4, 9,
        8, 9, 1, 4, 4, 4, 4, 9, 10, 11, 7, 7, 7, 11, 3, 3, 3,
        5, 5, 5, 7, 7, 3, 4, 9, 3, 3, 3, 6, 3, 6, 8, 7, 5,
        5, 4, 5, 3, 5, 3, 3, 5, 6, 4, 7, 10, 7, 10, 9, 9, 5,
        5, 1, 11, 8, 1, 8, 4, 9, 8, 5, 9, 4, 9, 4, 9, 4, 11,
        3, 5, 7, 3, 5, 7, 11, 3, 5, 7, 3, 5, 7, 11, 6, 6, 11,
        4, 5, 4, 3, 3]))
```

```
[ ] df.shape
```

```
(1451, 12)
```

```
# data selection form x and y variables
df.corr()
```

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
fixed acidity	1.000000	-0.297150	0.698363	0.180293	0.183549	-0.148815	-0.099928	0.659927	-0.705572	0.200371	-0.015114	0.145163
volatile acidity	-0.297150	1.000000	-0.589452	0.025977	0.072709	0.013943	0.110338	-0.004957	0.251343	-0.348126	-0.213213	-0.353443
citric acid	0.698363	-0.589452	1.000000	0.184960	0.100361	-0.074441	0.005301	0.371729	-0.520311	0.302815	0.168766	0.243999
residual sugar	0.180293	0.025977	0.184960	1.000000	0.126735	-0.000844	0.095093	0.344801	-0.075140	0.076129	0.162533	0.061482
chlorides	0.183549	0.072709	0.100361	0.126735	1.000000	-0.058163	0.045025	0.328695	-0.182841	0.022107	-0.205414	-0.108787
free sulfur dioxide	-0.148815	0.013943	-0.074441	-0.000844	-0.058163	1.000000	0.660188	-0.037630	0.108831	0.055956	-0.077993	-0.071202
total sulfur dioxide	-0.099928	0.110338	0.005301	0.095093	0.045025	0.660188	1.000000	0.118965	-0.005940	-0.039024	-0.259952	-0.237745
density	0.659927	-0.004957	0.371729	0.344801	0.328695	-0.037630	0.118965	1.000000	-0.312310	0.129896	-0.468312	-0.167568
pH	-0.705572	0.251343	-0.520311	-0.075140	-0.182841	0.108831	-0.005940	-0.312310	1.000000	-0.039082	0.135624	-0.082164
sulphates	0.200371	-0.348126	0.302815	0.076129	0.022107	0.055956	-0.039024	0.129896	-0.039082	1.000000	0.241636	0.386567
alcohol	-0.015114	-0.213213	0.168766	0.162533	-0.205414	-0.077993	-0.259952	-0.468312	0.135624	0.241636	1.000000	0.501501
quality	0.145163	-0.353443	0.243999	0.061482	-0.108787	-0.071202	-0.237745	-0.167568	-0.082164	0.386567	0.501501	1.000000

```
[ ] features_df = df[['alcohol','residual sugar','citric acid','sulphates','fixed acidity']]
X = np.asarray(features_df)
Y = np.asarray(df['quality'])
```

```
X[0:5]
```

```
array([[ 9.4 ,  1.9 ,  0. ,  0.56,  7.4 ],
       [ 9.8 ,  2.6 ,  0. ,  0.68,  7.8 ],
       [ 9.8 ,  2.3 ,  0.04,  0.65,  7.8 ],
       [ 9.8 ,  1.9 ,  0.56,  0.58, 11.2 ],
       [ 9.4 ,  1.9 ,  0. ,  0.56,  7.4 ]])
```

```
[ ] # Appending the column of ones to make for y intercept
m, n = X.shape
z=np.ones(m)
z=z.reshape(m,1)
X=np.append(z,X,axis=1)
print('X[0]= {},Y[0]={}'.format(X[0],Y[0]))
```

```
X[0]= [1.   9.4  1.9  0.   0.56  7.4 ],Y[0]=5
```

```
[ ] X.shape
```

```
(1451, 6)
```

```
# importing linear regression
import sklearn
from sklearn import linear_model
model = sklearn.linear_model.LinearRegression()
model.fit(X,Y)
```

```
LinearRegression()
```

```
[ ] Y_pred = model.predict(X)
```

```
[ ] print('MAE:{}'.format(np.abs(Y-Y_pred).mean()))
print('RMSE:{}'.format(np.sqrt(((Y-Y_pred)**2).mean())))
```

```
MAE:0.499683146106254
RMSE:0.6350735389645321
```

```
[ ] print('Intercept:'+str(model.intercept_))
print('Coeff:'+str(model.coef_))
```

```
Intercept:0.9171141040971547
Coeff:[ 0.          0.33783161 -0.04752743  0.20145466  1.52775834  0.03611803]
```

```
[ ] # Y = 0.917+0.33alcohol -0.0475residual suger +0.20citricacid+1.52sulphates+0.03fixedacidity
```