

## Q1.

```
In [1]: import pandas as pd
course_name = ['Data Science', 'Machine Learning', 'Big Data', 'Data Engineer']
duration = [2,3,6,4]

df = pd.DataFrame(data = {'course_name' : course_name, 'duration' : duration})
```

```
In [2]: df
```

```
Out[2]:
```

|   | course_name      | duration |
|---|------------------|----------|
| 0 | Data Science     | 2        |
| 1 | Machine Learning | 3        |
| 2 | Big Data         | 6        |
| 3 | Data Engineer    | 4        |

```
In [11]: df.iloc[1]
```

```
Out[11]: course_name    Machine Learning
duration              3
Name: 1, dtype: object
```

## Q2.

"""

- loc :
  - loc is primarily label-based indexing, meaning that you use the actual labels of the index and columns to select data. It is inclusive of both the start and stop indices.
- iloc :
  - iloc is integer-location based indexing, and it is used when you want to access a group of rows and columns by integer position. It is exclusive of the stop index.

"""

```
In [17]: new_df = df.reindex([3,0,1,2])
```

```
In [18]: new_df
```

Out[18]:

|   | course_name      | duration |
|---|------------------|----------|
| 3 | Data Engineer    | 4        |
| 0 | Data Science     | 2        |
| 1 | Machine Learning | 3        |
| 2 | Big Data         | 6        |

In [19]: `new_df.loc[2]`

Out[19]:

|             |          |
|-------------|----------|
| course_name | Big Data |
| duration    | 6        |

Name: 2, dtype: object

In [20]: `new_df.iloc[2]`

Out[20]:

|             |                  |
|-------------|------------------|
| course_name | Machine Learning |
| duration    | 3                |

Name: 1, dtype: object

"""

- Yeah , there's difference in both the outputs.
- loc is labelled based indexing
- iloc is integer location based indexing.

"""

## Q4.

In [22]: `import numpy as np`

```
columns = ['column_1','column_2','column_3','column_4','column_5','column_6']
indices = [1,2,3,4,5,6]

df1 = pd.DataFrame(np.random.rand(6,6), columns = columns, index = indices)
```

In [23]: `df1`

Out[23]:

|   | column_1 | column_2 | column_3 | column_4 | column_5 | column_6 |
|---|----------|----------|----------|----------|----------|----------|
| 1 | 0.317013 | 0.703714 | 0.203276 | 0.613538 | 0.557146 | 0.842089 |
| 2 | 0.377903 | 0.981643 | 0.664496 | 0.110976 | 0.207755 | 0.756048 |
| 3 | 0.602078 | 0.359350 | 0.647249 | 0.114877 | 0.787495 | 0.960312 |
| 4 | 0.023190 | 0.276299 | 0.860943 | 0.013986 | 0.045112 | 0.590341 |
| 5 | 0.046298 | 0.643201 | 0.487872 | 0.079799 | 0.439049 | 0.528111 |
| 6 | 0.817901 | 0.837246 | 0.415202 | 0.452625 | 0.582432 | 0.794173 |

In [24]: `df1.mean()`

```
Out[24]: column_1    0.364064  
        column_2    0.633575  
        column_3    0.546506  
        column_4    0.230967  
        column_5    0.436498  
        column_6    0.745179  
        dtype: float64
```

```
In [27]: df1['column_2'].std()
```

```
Out[27]: 0.27220996656039653
```

## Q5.

```
In [28]: df1.loc[2, 'column_2'] = 'string'
```

```
In [29]: df1
```

```
Out[29]:
```

|   | column_1 | column_2 | column_3 | column_4 | column_5 | column_6 |
|---|----------|----------|----------|----------|----------|----------|
| 1 | 0.317013 | 0.703714 | 0.203276 | 0.613538 | 0.557146 | 0.842089 |
| 2 | 0.377903 | string   | 0.664496 | 0.110976 | 0.207755 | 0.756048 |
| 3 | 0.602078 | 0.35935  | 0.647249 | 0.114877 | 0.787495 | 0.960312 |
| 4 | 0.023190 | 0.276299 | 0.860943 | 0.013986 | 0.045112 | 0.590341 |
| 5 | 0.046298 | 0.643201 | 0.487872 | 0.079799 | 0.439049 | 0.528111 |
| 6 | 0.817901 | 0.837246 | 0.415202 | 0.452625 | 0.582432 | 0.794173 |

```
In [30]: df1['column_2'].mean()
```

```

-----
TypeError                                Traceback (most recent call last)
Cell In[30], line 1
----> 1 df1['column_2'].mean()

File /opt/conda/lib/python3.10/site-packages/pandas/core/generic.py:11847, in NDFrame._add_numeric_operations.<locals>.mean(self, axis, skipna, level, numeric_only, **kwargs)
   11829 @doc(
   11830     _num_doc,
   11831     desc="Return the mean of the values over the requested axis.",
   (...)
   11845     **kwargs,
   11846 ):
> 11847     return NDFrame.mean(self, axis, skipna, level, numeric_only, **kwargs)

File /opt/conda/lib/python3.10/site-packages/pandas/core/generic.py:11401, in NDFrame.mean(self, axis, skipna, level, numeric_only, **kwargs)
   11393 def mean(
   11394     self,
   11395     axis: Axis | None | lib.NoDefault = lib.no_default,
   (...)
   11399     **kwargs,
   11400 ) -> Series | float:
> 11401     return self._stat_function(
   11402         "mean", nanops.nanmean, axis, skipna, level, numeric_only, **kwargs
   11403     )

File /opt/conda/lib/python3.10/site-packages/pandas/core/generic.py:11353, in NDFrame._stat_function(self, name, func, axis, skipna, level, numeric_only, **kwargs)
   11343     warnings.warn(
   11344         "Using the level keyword in DataFrame and Series aggregations is
   11345         deprecated and will be removed in a future version. Use groupby
   (...)
   11348         stacklevel=find_stack_level(),
   11349     )
   11350     return self._agg_by_level(
   11351         name, axis=axis, level=level, skipna=skipna, numeric_only=numeric_only
   11352     )
> 11353     return self._reduce(
   11354         func, name=name, axis=axis, skipna=skipna, numeric_only=numeric_only
   11355     )

File /opt/conda/lib/python3.10/site-packages/pandas/core/series.py:4816, in Series._reduce(self, op, name, axis, skipna, numeric_only, filter_type, **kwargs)
   4812     raise NotImplementedError(
   4813         f"Series.{name} does not implement {kwd_name}."
   4814     )
   4815     with np.errstate(all="ignore"):
-> 4816     return op(delegate, skipna=skipna, **kwargs)

File /opt/conda/lib/python3.10/site-packages/pandas/core/nanops.py:93, in disallow.__call__.<locals>._f(*args, **kwargs)

```

```

91 try:
92     with np.errstate(invalid="ignore"):
---> 93         return f(*args, **kwargs)
94 except ValueError as e:
95     # we want to transform an object array
96     # ValueError message to the more typical TypeError
97     # e.g. this is normally a disallowed function on
98     # object arrays that contain strings
99     if is_object_dtype(args[0]):

File /opt/conda/lib/python3.10/site-packages/pandas/core/nanops.py:155, in bottleneck_switch.__call__.<locals>.f(values, axis, skipna, **kws)
    153         result = alt(values, axis=axis, skipna=skipna, **kws)
    154 else:
--> 155     result = alt(values, axis=axis, skipna=skipna, **kws)
    157 return result

File /opt/conda/lib/python3.10/site-packages/pandas/core/nanops.py:418, in _datetimelike_compat.<locals>.new_func(values, axis, skipna, mask, **kwargs)
    415 if datetimelike and mask is None:
    416     mask = isna(values)
--> 418 result = func(values, axis=axis, skipna=skipna, mask=mask, **kwargs)
    420 if datetimelike:
    421     result = _wrap_results(result, orig_values.dtype, fill_value=iNaT)

File /opt/conda/lib/python3.10/site-packages/pandas/core/nanops.py:706, in nanmean(values, axis, skipna, mask)
    703     dtype_count = dtype
    705     count = _get_counts(values.shape, mask, axis, dtype=dtype_count)
--> 706     the_sum = _ensure_numeric(values.sum(axis, dtype=dtype_sum))
    708     if axis is not None and getattr(the_sum, "ndim", False):
    709         count = cast(np.ndarray, count)

File /opt/conda/lib/python3.10/site-packages/numpy/core/_methods.py:48, in _sum(a, axis, dtype, out, keepdims, initial, where)
    46 def _sum(a, axis=None, dtype=None, out=None, keepdims=False,
    47         initial=_NoValue, where=True):
---> 48     return umr_sum(a, axis, dtype, out, keepdims, initial, where)

TypeError: unsupported operand type(s) for +: 'float' and 'str'

```

""" Calculating the mean of a column containig non-numeric data will result in NaN values in the mean.

"""

## Q6.

Window functions are used for performing calculations on a specified subset of data called a "window" that moves or rolls through the data.

- rolling()
- expanding()
- ewm()

"""

## Q7.

```
In [32]: from datetime import datetime
current_dt_time = datetime.now()

pd.to_datetime(current_dt_time)
```

Out[32]: Timestamp('2023-11-14 14:51:52.853474')

## Q8.

```
In [41]: def cal_time(start_date,end_date):
    start_datetime = pd.to_datetime(start_date)
    end_datetime = pd.to_datetime(end_date)

    time_diff = end_datetime - start_datetime

    days = time_diff.days
    hours,remainder = divmod(time_diff.seconds,3600)
    minutes = divmod(remainder,60)
    return days , hours , minutes

s_date_input = input("Enter the start date : ")
e_date_input = input("Enter the end date : ")

days_diff , hours_diff , minutes_diff = cal_time(s_date_input,e_date_input)
print(f" Time difference : {days_diff} days, {hours_diff} hours , {minutes_diff}
```

Time difference : 364 days, 0 hours , (0, 0) minutes.

## Q9.

```
In [3]: def convert_and_display_categorical(file_path, column_name, category_order):
    df = pd.read_csv(file_path)

    df[column_name] = pd.Categorical(df[column_name], categories=category_or

    sorted_data = df.sort_values(by=column_name)
    print("\nSorted Data:")
    print(sorted_data)

file_path_input = input("Enter the CSV file path: ")
```

```
column_name_input = input("Enter the column name to convert to categorical: ")  
  
category_order_input = input("Enter the category order (comma-separated): ")  
category_order = category_order_input.split(',')  
  
convert_and_display_categorical(file_path_input, column_name_input, category_order)
```

Sorted Data:

|    | id  | location_id | program_id | accepted_payments        | \ |
|----|-----|-------------|------------|--------------------------|---|
| 0  | NaN | 1           | NaN        | NaN                      |   |
| 1  | NaN | 2           | NaN        | NaN                      |   |
| 2  | NaN | 3           | NaN        | NaN                      |   |
| 3  | NaN | 4           | NaN        | NaN                      |   |
| 4  | NaN | 5           | NaN        | NaN                      |   |
| 5  | NaN | 6           | NaN        | NaN                      |   |
| 6  | NaN | 7           | NaN        | NaN                      |   |
| 7  | NaN | 8           | NaN        | NaN                      |   |
| 8  | NaN | 9           | NaN        | NaN                      |   |
| 9  | NaN | 10          | NaN        | NaN                      |   |
| 10 | NaN | 11          | NaN        | NaN                      |   |
| 11 | NaN | 12          | NaN        | NaN                      |   |
| 12 | NaN | 13          | NaN        | NaN                      |   |
| 13 | NaN | 14          | NaN        | NaN                      |   |
| 14 | NaN | 15          | NaN        | NaN                      |   |
| 15 | NaN | 16          | NaN        | NaN                      |   |
| 16 | NaN | 17          | NaN        | NaN                      |   |
| 17 | NaN | 18          | NaN        | NaN                      |   |
| 18 | NaN | 19          | NaN        | NaN                      |   |
| 19 | NaN | 20          | NaN        | NaN                      |   |
| 20 | NaN | 21          | NaN        | NaN                      |   |
| 21 | NaN | 22          | NaN        | Cash, Check, Credit Card |   |
| 22 | NaN | 22          | NaN        | NaN                      |   |

|    | alternate_name        | application_process                               | \ |
|----|-----------------------|---|---|
| 0  | NaN                   | Walk in or apply by phone.                        |   |
| 1  | NaN                   | Apply by phone for an appointment.                |   |
| 2  | NaN                   | Phone for information (403-4300 Ext. 4322).       |   |
| 3  | NaN                   | Apply by phone.                                   |   |
| 4  | NaN                   | Phone for information.                            |   |
| 5  | NaN                   | Walk in or apply by phone for membership appli... |   |
| 6  | NaN                   | Apply by phone or be referred by a doctor, soc... |   |
| 7  | NaN                   | Apply by phone.                                   |   |
| 8  | NaN                   | Walk in. Proof of residency in California requ... |   |
| 9  | NaN                   | Walk in. Proof of California residency to rece... |   |
| 10 | NaN                   | Walk in. Proof of California residency require... |   |
| 11 | NaN                   | Walk in or apply by phone, email or webpage re... |   |
| 12 | NaN                   | Walk in. Proof of California residency require... |   |
| 13 | NaN                   | Call for appointment. Referral from human serv... |   |
| 14 | NaN                   | Walk in or through other agency referral.         |   |
| 15 | NaN                   | Walk in. Written application, identification r... |   |
| 16 | NaN                   | Call for information.                             |   |
| 17 | NaN                   | Call for screening appointment. Medical visits... |   |
| 18 | NaN                   | Call for screening appointment (650-347-3648).    |   |
| 19 | NaN                   | Walk in.  |   |
| 20 | NaN                   | By phone during business hours.                   |   |
| 21 | Fotos para pasaportes | Walk in or apply by phone or mail                 |   |
| 22 | NaN                   | Walk in or apply by phone or mail                 |   |

|   | audience  | \ |
|---|---|---|
| 0 | Older adults age 55 or over, ethnic minorities... |   |
| 1 | Residents of San Mateo County age 55 or over      |   |
| 2 | Older adults age 55 or over who can benefit fr... |   |
| 3 | Parents, children, families with problems of c... |   |
| 4 | Low-income working families with children tran... |   |
| 5 | Any age   |   |
| 6 | Older adults who have memory or sensory loss, ... |   |
| 7 | Senior citizens age 60 or over, disabled indiv... |   |



```

8      Ethnic minorities, especially Spanish speaking
9                                          NaN
10                                         NaN
11 Adults, parents, children in 1st-12th grades i...
12                                         NaN
13 Individuals or families with low or no income ...
14 Adult alcoholic/drug addictive men and women w...
15                                         NaN
16                                         NaN
17                                         NaN
18                                         NaN
19                                         NaN
20                                         NaN
21 Profit and nonprofit businesses, the public, m...
22 Second service and nonprofit businesses, the p...

```

```

description \
0 A walk-in center for older adults that provide...
1 Provides training and job placement to eligibl...
2 Offers supportive counseling services to San M...
3 Provides supervised visitation services and a ...
4 Provides fixed 8% short term loans to eligible...
5 A multipurpose center offering a wide variety ...
6 Rosener House is a day center for older adults...
7 Delivers a hot meal to the home of persons age...
8 Provides general reading material, including b...
9 Provides general reading and media materials, ...
10 Provides general reading materials, including ...
11 Offers an intergenerational literacy program f...
12 Provides general reading materials, including ...
13 Provides food, clothing, bus tokens and shelte...
14 Provides a long-term (6-12 month) residential ...
15 Provides emergency assistance including food a...
16 Provides emergency food, clothing and furnitur...
17 By appointment only, Project Smile provides a ...
18 Provides free medical and dental care to those...
19      no unrequired fields for this service
20      just a test service
21 [NOTE THIS IS NOT A REAL SERVICE--THIS IS FOR ...
22 [NOTE THIS IS NOT A REAL ORGANIZATION--THIS IS...

```

```

eligibility email \
0 Age 55 or over for most programs, age 60 or ov... NaN
1 Age 55 or over, county resident and willing an... NaN
2      Resident of San Mateo County age 55 or over NaN
3                                          None NaN
4 Eligibility: Low-income family with legal cust... NaN
5                                          None NaN
6      Age 18 or over NaN
7      Homebound person unable to cook or shop NaN
8      Resident of California to obtain a library card NaN
9      Resident of California to obtain a card NaN
10 Resident of California to obtain a library car... NaN
11 English-speaking adult reading at or below 7th... NaN
12      Resident of California to obtain a library card NaN
13 None for most services. For emergency assistan... NaN
14 Age 21-60, detoxed, physically able and willin... NaN
15      None for emergency assistance NaN
16      Low-income families NaN
17      Low-income person without access to health care NaN

```

|    |   |      |                       |
|----|---|------|-----------------------|
| 18 | Low-income person without access to health care |      | NaN                   |
| 19 |   | NaN  | NaN                   |
| 20 |   | NaN  | NaN                   |
| 21 |   | None | passports@example.org |
| 22 |   | None | NaN                   |

|    |   |                         |   |
|----|---|-------------------------|---|
|    | ...   | interpretation_services | \ |
| 0  | ...   | NaN                     |   |
| 1  | ...   | NaN                     |   |
| 2  | ...   | NaN                     |   |
| 3  | ...   | NaN                     |   |
| 4  | ...   | NaN                     |   |
| 5  | ...   | NaN                     |   |
| 6  | ...   | NaN                     |   |
| 7  | ...   | NaN                     |   |
| 8  | ...   | NaN                     |   |
| 9  | ...   | NaN                     |   |
| 10 | ...   | NaN                     |   |
| 11 | ...   | NaN                     |   |
| 12 | ...   | NaN                     |   |
| 13 | ...   | NaN                     |   |
| 14 | ...   | NaN                     |   |
| 15 | ...   | NaN                     |   |
| 16 | ...   | NaN                     |   |
| 17 | ...   | NaN                     |   |
| 18 | ...   | NaN                     |   |
| 19 | ...   | NaN                     |   |
| 20 | ...   | NaN                     |   |
| 21 | ... We offer 3-way interpretation services over th... |                         |   |
| 22 | ...   | NaN                     |   |

|    |   |                 |           |   |
|----|---|-----------------|-----------|---|
|    |   | keywords        | languages | \ |
| 0  | ADULT PROTECTION AND CARE SERVICES, Meal Sites... |                 | NaN       |   |
| 1  | EMPLOYMENT/TRAINING SERVICES, Job Development,... |                 | NaN       |   |
| 2  | Geriatric Counseling, Older Adults, Gay, Lesbi... |                 | NaN       |   |
| 3  | INDIVIDUAL AND FAMILY DEVELOPMENT SERVICES, Gr... |                 | NaN       |   |
| 4  | COMMUNITY SERVICES, Speakers, Automobile Loans    |                 | NaN       |   |
| 5  | ADULT PROTECTION AND CARE SERVICES, In-Home Su... |                 | NaN       |   |
| 6  | ADULT PROTECTION AND CARE SERVICES, Adult Day ... |                 | NaN       |   |
| 7  | ADULT PROTECTION AND CARE SERVICES, Meal Sites... |                 | NaN       |   |
| 8  | EDUCATION SERVICES, Library, Libraries, Public... |                 | NaN       |   |
| 9  | EDUCATION SERVICES, Library, Libraries, Public... |                 | NaN       |   |
| 10 | EDUCATION SERVICES, Library, Libraries, Public... |                 | NaN       |   |
| 11 | EDUCATION SERVICES, Adult, Alternative, Litera... |                 | NaN       |   |
| 12 | EDUCATION SERVICES, Library, Libraries, Public... |                 | NaN       |   |
| 13 | COMMUNITY SERVICES, Interpretation/Translation... |                 | NaN       |   |
| 14 | ALCOHOLISM SERVICES, Residential Care, DRUG AB... |                 | NaN       |   |
| 15 | COMMODITY SERVICES, Clothing/Personal Items, C... |                 | NaN       |   |
| 16 | COMMODITY SERVICES, Clothing/Personal Items, C... |                 | NaN       |   |
| 17 | HEALTH SERVICES, Outpatient Care, Community Cl... |                 | NaN       |   |
| 18 | HEALTH SERVICES, Outpatient Care, Community Cl... |                 | NaN       |   |
| 19 |   | NaN             | NaN       |   |
| 20 |   | NaN             | NaN       |   |
| 21 |   | Salud, Medicina | Spanish   |   |
| 22 | Ruby on Rails/Postgres/Redis, testing, wic        |                 | NaN       |   |

|   |                                  |   |
|---|----------------------------------|---|
|   | name                             | \ |
| 0 | Fair Oaks Adult Activity Center  |   |
| 1 | Second Career Employment Program |   |
| 2 | Senior Peer Counseling           |   |

```

3           Family Visitation Center
4       Economic Self-Sufficiency Program
5   Little House Recreational Activities
6       Rosener House Adult Day Services
7           Meals on Wheels - South County
8               Fair Oaks Branch
9               Main Library
10              Schaberg Branch
11              Project Read
12              Redwood Shores Branch
13              Redwood City Corps
14          Adult Rehabilitation Center
15              Sunnyvale Corps
16      South San Francisco Citadel Corps
17              Project Smile
18          San Mateo Free Medical Clinic
19          Service with blank fields
20      Service for Admin Test Location
21              Passport Photos
22          Example Service Name

```

```

                                required_documents \
0                                     NaN
1                                     NaN
2                                     NaN
3                                     NaN
4                                     NaN
5                                     NaN
6                                     NaN
7                                     NaN
8                                     NaN
9                                     NaN
10                                    NaN
11                                    NaN
12                                    NaN
13                                    NaN
14                                    NaN
15                                    NaN
16                                    NaN
17                                    NaN
18                                    NaN
19                                    NaN
20                                    NaN
21      Government-issued picture identification
22                                    NaN

```

```

                                service_areas      status \
0                                     Colma      active
1          San Mateo County      active
2          San Mateo County      active
3          San Mateo County      active
4          San Mateo County      active
5          San Mateo County      active
6      Belmont, Burlingame, East Palo Alto      active
7          Belmont, East Palo Alto      active
8          San Mateo County      active
9          San Mateo County      active
10         San Mateo County      active
11             Daly City      active
12         San Mateo County      active

```

|    |                                       |          |
|----|---------------------------------------|----------|
| 13 | Belmont, Burlingame, East Palo Alto   | active   |
| 14 | Alameda County, San Mateo County      | active   |
| 15 | NaN                                   | active   |
| 16 | Colma, Daly City, South San Francisco | active   |
| 17 | East Palo Alto                        | active   |
| 18 | Belmont, Burlingame                   | active   |
| 19 | NaN                                   | defunct  |
| 20 | San Mateo County                      | inactive |
| 21 | Alameda County, San Mateo County      | active   |
| 22 | San Mateo County, Alameda County      | active   |

|    | wait_time   | website   |
|----|---|---|
| \  |   |   |
| 0  | No wait.  | NaN   |
| 1  | Varies.   | NaN   |
| 2  | Varies.   | NaN   |
| 3  | No wait.  | NaN   |
| 4  | NaN   | NaN   |
| 5  | No wait.  | NaN   |
| 6  | No wait.  | NaN   |
| 7  | No wait.  | NaN   |
| 8  | No wait.  | NaN   |
| 9  | No wait.  | NaN   |
| 10 | No wait.  | NaN   |
| 11 | Depends on availability of tutors for small gr... | NaN   |
| 12 | No wait.  | NaN   |
| 13 | Up to 20 minutes.                                 | NaN   |
| 14 | Varies according to available beds for men and... | NaN   |
| 15 | No wait.  | NaN   |
| 16 | NaN   | NaN   |
| 17 | Varies.   | NaN   |
| 18 | Varies.   | NaN   |
| 19 | NaN   | NaN   |
| 20 | NaN   | NaN   |
| 21 | No wait to 2 weeks.                               | <a href="http://www.example.com">http://www.example.com</a> |
| 22 | No wait to 2 weeks                                | <a href="http://www.example.com">http://www.example.com</a> |

|    | taxonomy_ids                             |
|----|--|
| 0  | NaN                                      |
| 1  | NaN                                      |
| 2  | NaN                                      |
| 3  | NaN                                      |
| 4  | NaN                                      |
| 5  | NaN                                      |
| 6  | NaN                                      |
| 7  | NaN                                      |
| 8  | NaN                                      |
| 9  | NaN                                      |
| 10 | NaN                                      |
| 11 | NaN                                      |
| 12 | NaN                                      |
| 13 | NaN                                      |
| 14 | NaN                                      |
| 15 | NaN                                      |
| 16 | NaN                                      |
| 17 | NaN                                      |
| 18 | NaN                                      |
| 19 | NaN                                      |
| 20 | NaN                                      |
| 21 | 105, 108, 108-05, 108-05-01, 111, 111-05 |

22

NaN

[23 rows x 22 columns]

## Q10.

```
In [ ]: import matplotlib.pyplot as plt

file_path_input = input("Enter the CSV file path containing sales data: ")
df = pd.read_csv(file_path_input)

pivot_df = df.pivot(index='Date', columns='Product Category', values='Sales')

pivot_df.plot(kind='bar', stacked=True, figsize=(10, 6))

plt.title('Sales Data by Product Category Over Time')
plt.xlabel('Date')
plt.ylabel('Sales')
plt.legend(title='Product Category')

plt.show()
```

## Q11.

```
In [4]: pip install tabulate
```

```
Collecting tabulate
  Downloading tabulate-0.9.0-py3-none-any.whl (35 kB)
Installing collected packages: tabulate
Successfully installed tabulate-0.9.0
Note: you may need to restart the kernel to use updated packages.
```

```
In [ ]: from tabulate import tabulate
file_path = input("Enter the file path of the CSV file containing student data: ")

df = pd.read_csv(file_path)

mean_score = df['Test Score'].mean()
median_score = df['Test Score'].median()
mode_scores = df['Test Score'].mode()

result_table = pd.DataFrame({
    'Statistic': ['Mean', 'Median', 'Mode'],
    'Value': [mean_score, median_score, ', '.join(map(str, mode_scores))]
})

print("\n" + tabulate(result_table, headers='keys', tablefmt='fancy_grid', showi
```