

Q.1 Write a program to distinguish between Array Indexing and Fancy Indexing.

```
In [ ]: import numpy as np

array1 = np.array([1, 2, 3, 4, 5, 6, 7, 8])

simple_indexing = array1[3]

print("Simple Indexing:", simple_indexing)

fancy_indexing = array1[[1, 2, 5, 7]]

print("Fancy Indexing:", fancy_indexing)
```

Simple Indexing: 4

Fancy Indexing: [2 3 6 8]

Q2. Execute the 2D array Slicing.

```
In [ ]: import numpy as np

array1 = np.array([[1, 3, 5, 7],
                   [9, 11, 13, 15],
                   [2, 4, 6, 8]])

subarray1 = array1[:2, :2]
subarray2 = array1[1:3, 2:4]

print("First Two Rows and Columns: \n", subarray1)
print("Last two Rows and Columns: \n", subarray2)
```

First Two Rows and Columns:

[[1 3]

[9 11]]

Last two Rows and Columns:

[[13 15]

[6 8]]

In []: Q3. Create the 5-Dimensional arrays using ndmin.

```
In [ ]: import numpy as np

arr = np.array([1, 2, 3, 4], ndmin=5)
print(arr)
```

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

Q4. Reshape the array from 1-D to 2-D array.

```
In [ ]: import numpy as np

arr_1d = np.array([1, 2, 3, 4, 5, 6])
arr_2d = arr_1d.reshape(2, 3)
```

```
print(arr_2d)
```

```
[[1 2 3]
 [4 5 6]]
```

Q5. Perform the Stack functions in Numpy arrays – Stack(), hstack(), vstack(), and dstack().

```
In [ ]: import numpy as np

arr1 = np.array([1, 2, 3])
arr2 = np.array([4, 5, 6])

a= np.stack((arr1, arr2), axis=0)
b = np.hstack((arr1, arr2))
c=np.vstack((arr1,arr2))
d=np.dstack((arr1,arr2))
print(a,"\n")
print(b,"\n")
print(c,"\n")
print(d,"\n")
```

```
[[1 2 3]
 [4 5 6]]
```

```
[1 2 3 4 5 6]
```

```
[[1 2 3]
 [4 5 6]]
```

```
[[[1 4]
 [2 5]
 [3 6]]]
```

Q6. Perform the searchsort method in Numpy array.

```
In [ ]: import numpy as np

arr = np.array([3, 1, 2, 5, 4])
sorted_arr = np.sort(arr)

print(sorted_arr)
```

```
[1 2 3 4 5]
```

Q7. Create Numpy Structured array using your domain features.

```
In [ ]: import numpy as np

dtype = [('name', 'U50'), ('price', float), ('availability', bool), ('category', 'U50')]

canteen_items = np.array([], dtype=dtype)

item1 = ('Sandwich', 5.99, True, 'Snacks')
item2 = ('Salad', 4.49, True, 'Healthy')
```

```

item3 = ('Pizza', 7.99, False, 'Fast Food')

canteen_items = np.array([item1, item2, item3], dtype=dtype)

print("Item Names:", canteen_items['name'])
print("Prices:", canteen_items['price'])
print("Availability:", canteen_items['availability'])
print("Categories:", canteen_items['category'])

snacks = canteen_items[canteen_items['category'] == 'Snacks']
print("\nSnacks:")
print(snacks)

```

Item Names: ['Sandwich' 'Salad' 'Pizza']
 Prices: [5.99 4.49 7.99]
 Availability: [True True False]
 Categories: ['Snacks' 'Healthy' 'Fast Food']

Snacks:
 [('Sandwich', 5.99, True, 'Snacks')]

Q8. Create Data frame using List and Dictionary.

```

In [ ]: import pandas as pd

# Create a DataFrame using a list of dictionaries
data = [
    {'Name': 'Alice', 'Age': 28, 'City': 'New York'},
    {'Name': 'Bob', 'Age': 32, 'City': 'Los Angeles'},
    {'Name': 'Charlie', 'Age': 24, 'City': 'Chicago'}
]

df_from_list_of_dicts = pd.DataFrame(data)

# Create a DataFrame using a dictionary of lists
data = {
    'Name': ['Alice', 'Bob', 'Charlie'],
    'Age': [28, 32, 24],
    'City': ['New York', 'Los Angeles', 'Chicago']
}

df_from_dict_of_lists = pd.DataFrame(data)

print("DataFrame created from a list of dictionaries:")
print(df_from_list_of_dicts)

print("\nDataFrame created from a dictionary of lists:")
print(df_from_dict_of_lists)

```

DataFrame created from a list of dictionaries:

	Name	Age	City
0	Alice	28	New York
1	Bob	32	Los Angeles
2	Charlie	24	Chicago

DataFrame created from a dictionary of lists:

	Name	Age	City
0	Alice	28	New York
1	Bob	32	Los Angeles
2	Charlie	24	Chicago

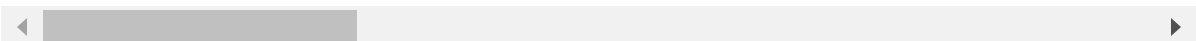
Q9. Create Data frame on your Domain area and perform the following operations to find and eliminate the missing data from the dataset.

```
In [ ]: import pandas as pd
df=pd.read_csv(r"university_canteen_data_with_nan.csv")
df=df.head(10)
df.isnull()
```

```
Out[ ]:   Student_ID  Student_Name  Student_Department  Student_Year  Student_Contact_Info  Tr
```

0	False	False	False	False	False
1	False	False	False	False	False
2	False	True	False	False	False
3	False	False	False	False	False
4	False	False	False	False	False
5	False	True	False	False	False
6	False	False	False	False	False
7	False	False	False	False	False
8	False	False	False	False	False
9	False	False	False	False	False

10 rows × 30 columns

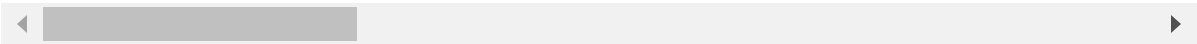


```
In [ ]: df=df.head(7)
df.notnull()
```

Out []:

	Student_ID	Student_Name	Student_Department	Student_Year	Student_Contact_Info	Tr
0	True	True	True	True	True	
1	True	True	True	True	True	
2	True	False	True	True	True	
3	True	True	True	True	True	

4 rows × 30 columns



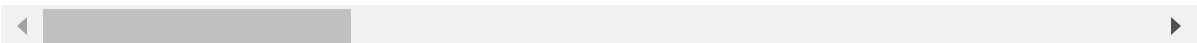
In []:

```
df=df.head(5)  
df.dropna()
```

Out []:

	Student_ID	Student_Name	Student_Department	Student_Year	Student_Contact_Info	Tr
1	7890	Shelly Cruz	might	Sophomore	vlewis@example.org	
3	5242	Kathleen Kelly	small	Junior	qlopez@example.com	

2 rows × 30 columns



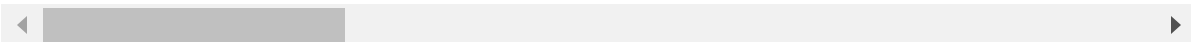
In []:

```
df=df.head(5)  
df.fillna("hello")
```

Out[]:

	Student_ID	Student_Name	Student_Department	Student_Year	Student_Contact_Info
0	7311	Richard Barron	pay	Sophomore	qcrane@example.com
1	7890	Shelly Cruz	might	Sophomore	vlewis@example.org
2	1663	hello	type	Freshman	cobbdana@example.com
3	5242	Kathleen Kelly	small	Junior	qlopez@example.com

4 rows × 30 columns



In []:

In []:

```
import pandas as pd

# Step 1: Read the CSV file into a DataFrame
df = pd.read_csv('university_canteen_data_with_nan.csv')

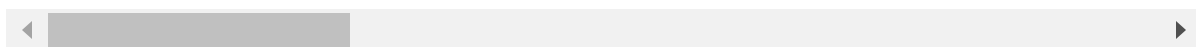
# Step 2: Perform the data replacement operation on the 'Quantity_Purchased' column
# For example, Let's replace all occurrences of '10' with '20'
df['Quantity_Purchased'] = df['Quantity_Purchased'].replace(4, 5)

# Step 3: Write the modified DataFrame back to the same CSV file
df.to_csv('university_canteen_data_with_nan', index=False)
df=df.head(4)
df
```

Out[]:

	Student_ID	Student_Name	Student_Department	Student_Year	Student_Contact_Info
0	7311	Richard Barron	pay	Sophomore	qcrane@example.com
1	7890	Shelly Cruz	might	Sophomore	vlewis@example.org
2	1663	NaN	type	Freshman	cobbdana@example.com
3	5242	Kathleen Kelly	small	Junior	qlopez@example.com

4 rows × 30 columns



In []:

```
import pandas as pd

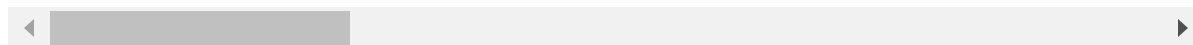
# Step 1: Read the CSV file into a DataFrame
df = pd.read_csv('university_canteen_data_with_nan.csv')
b=df.interpolate(method='linear', inplace=True)
df.head(5)

# Step 3: Write the modified DataFrame back to the same CSV file
```

Out[]:

	Student_ID	Student_Name	Student_Department	Student_Year	Student_Contact_Info
0	7311	Richard Barron	pay	Sophomore	qcrane@example.com
1	7890	Shelly Cruz	might	Sophomore	vlewis@example.org
2	1663	NaN	type	Freshman	cobbdana@example.com
3	5242	Kathleen Kelly	small	Junior	qlopez@example.com
4	9376	Heather Brown	billion	Freshman	kimberly71@example.net

5 rows × 30 columns



Q10. Perform the Hierarchical Indexing in the above created dataset.

```
In [ ]: import pandas as pd

# Read the CSV file without a hierarchical index
df = pd.read_csv('university_canteen_data_with_nan.csv')

df.set_index(['Menu_Item_ID', 'Total_Cost'], inplace=True)
a=df.head(5)
b=a.sort_index()
b
```


Out[]:

		Student_ID	Student_Name	Student_Department	Student_Year
Menu_Item_ID	Total_Cost				
20	3.06	1663	NaN	type	Freshman
21	9.83	7890	Shelly Cruz	might	Sophomore
35	13.57	7311	Richard Barron	pay	Sophomore
38	12.53	9376	Heather Brown	billion	Freshman
75	11.08	5242	Kathleen Kelly	small	Junior

5 rows × 28 columns

