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', 'U

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[ ]:

Menu_Item_ID	Total_Cost	Student_ID	Student_Name	Student_Department	Student_Year
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