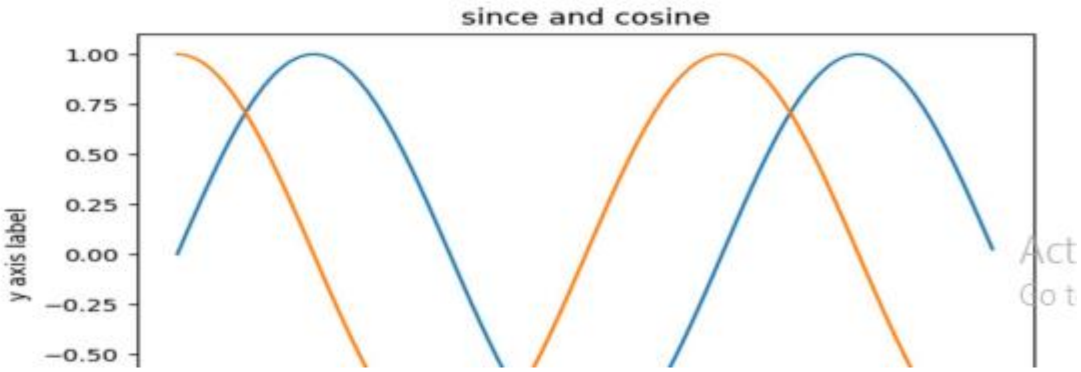
1.

```
import numpy as np
a = np.array([1, 2, 3]) # Create a rank 1 array
print("One dimensional array a = ",a)
b = np.array([[1,2,3],[4,5,6]])
print("Two dimensional array b = ",b)
print("Size of the array: ",a.shape)
print("Element at indices 0,1,2 : ",a[0], a[1], a[2])
a[0] = 5 # Change an element of the array
print("Array after changing the element at index 0 : ",a)
a = np.zeros((2,2)) # Create an array of all zeros
print("An array of all zeros : ",a)
b = np.ones((1,2)) # Create an array of all ones
print("An array of all ones : ",b)
c = np.full((2,2), 7) # Create a constant array
print("A constant array : ",c)
d = np.eye (2) # Create a 2x2 identity matrix
print("A 2*2 identity matrix : ",d)
e = np.random.random((2,2)) # Create an array filled with random values
print("An array with random values : ",e)
```

2.

```
import numpy as np
import matplotlib.pyplot as plt
x=np.arange(0,3*np.pi,0.1)
y_sin=np.sin(x)
y_cos=np.cos(x)
plt.plot(x,y_sin)
plt.plot(x,y_cos)
plt.xlabel('x axis label')
plt.ylabel('y axis label')
plt.title('since and cosine')
plt.legend(['since','cosine'])
plt.show()
```

OUTPUT



3. You have two NumPy arrays, arr1 and arr2, containing the following data:

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

arr2 = np.array([6, 7, 8, 9, 10])
```

Write NumPy code to perform the following operations:

1. Add arr1 and arr2 to create a new array called result_add.
2. Multiply arr1 and arr2 to create a new array called result_multiply.
3. Calculate the mean of result_add.
4. Find the maximum value in result_multiply.

```
import numpy as np

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

arr2 = np.array([6, 7, 8, 9, 10])

result_add = arr1 + arr2

result_multiply = arr1 * arr2

mean_result_add = np.mean(result_add)

max_result_multiply = np.max(result_multiply)
```

4.create the dataset

a. create dataframe

b.show top 5 rows

c remove multiple columns at once

d. rename two of the columns by using the 'rename' method

```
import pandas as pd
import numpy as np

# a. Create a dataframe
data = {
    'First_Name': ['Alice', 'Bob', 'Charlie', 'David', 'Eva','Arun'],
    'Last_Name': ['Smith', 'Jones', 'Johnson', 'Brown', 'Lee',' Jacob'],
    'Age': [25, 30, 22, 35, 28,25],
    'Salary': [50000, 60000, 45000, 70000, 55000,45000],
    'Department': ['HR', 'IT', 'Marketing', 'Finance', 'Operations','Finance']
}

df = pd.DataFrame(data)

# b. Show top 5 rows
print("Top 5 rows:")
print(df.head())

# c. Remove multiple columns at once
columns_to_remove = ['Last_Name']
df = df.drop(columns=columns_to_remove)

# d. Rename two columns using the 'rename' method with numpy
new_column_names = {
    'Age': 'Employee_Age',
    'Salary': 'Employee_Salary'
}

df = df.rename(columns=new_column_names)

# Display the modified dataframe
print("\nDataFrame after removing columns and renaming:")
print(df)
```

5.Write a program to implement KNN algorithm using iris data Set

```
from sklearn.datasets

import load_iris

from sklearn.model_selection import train_test_split

from sklearn.neighbors import KNeighborsClassifier

from sklearn import metrics

iris=load_iris()

x=iris.data

y=iris.target
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3,random_state
=1) c_knn=KNeighborsClassifier(n_neighbors=3)

c_knn.fit(x_train,y_train)
```

```
y_pred=c_knn.predict(x_test)
print("Accuracy:",metrics.accuracy_score(y_test,y_pred))
sample=[[2,2,2,2]]
pred=c_knn.predict(sample)
pred_v=[iris.target_names[p] for p in pred]
print(pred_v)
```

6.Write a program to implement decision tree algorithm using the given data set

```
import pandas as pd
import numpy as np
from sklearn.datasets import load_iris
data = load_iris()
data.data.shape
print('classes to predict: ',data.target_names)
print('Features: ',data.feature_names)
X = data.data
y = data.target
display (X.shape, y.shape)
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
```

```
X_train, X_test, y_train, y_test = train_test_split(X, y,random_state = 50,
test_size = 0.25)

classifier = DecisionTreeClassifier()

classifier.fit(X_train, y_train)

y_pred = classifier.predict(X_test)

from sklearn.metrics import accuracy_score

print('Accuracy on train data using Gini: ',accuracy_score(y_true = y_train,
y_pred = classifier.predict(X_train)))

print('Accuracy on test data using Gini: ',accuracy_score(y_true = y_test,
y_pred = y_pred))

classifier_entropy = DecisionTreeClassifier(criterion='entropy')

classifier_entropy.fit(X_train, y_train)

y_pred_entropy = classifier_entropy.predict(X_test)

print('Accuracy on train data using entropy', accuracy_score(y_true=y_train,
y_pred = classifier_entropy.predict(X_train)))

print('Accuracy on test data using entropy', accuracy_score(y_true=y_test,
y_pred = y_pred_entropy))

classifier_entropy1 = DecisionTreeClassifier(criterion='entropy',
min_samples_split=50) classifier_entropy1.fit(X_train, y_train)

y_pred_entropy1 = classifier_entropy1.predict(X_test)

print('Accuracy on train data using entropy', accuracy_score(y_true=y_train,
y_pred = classifier_entropy1.predict(X_train)))
```

```
print('Accuracy on test data using entropy', accuracy_score(y_true=y_test,
y_pred = y_pred_entropy1))
from sklearn.tree import export_graphviz
from six import StringIO
from IPython.display import Image
import pydotplus
dot_data = StringIO()
export_graphviz(classifier, out_file = dot_data,filled = True, rounded =
True,special_characters = True, feature_names = data.feature_names,
class_names = data.target_names)
graph = pydotplus.graph_from_dot_data(dot_data.getvalue())
Image(graph.create_png())
```

7.Write a program to implement Linear Regression using appropriate data set.

```
import matplotlib.pyplot as plt
import numpy as np
from sklearn import datasets, linear_model
from sklearn.metrics import mean_squared_error, r2_score
diabetes_X, diabetes_y = datasets.load_diabetes(return_X_y=True)
diabetes_X = diabetes_X[:, np.newaxis, 2]
diabetes_X_train = diabetes_X[:-20]
```

```
diabetes_X_test = diabetes_X[-20:]
diabetes_y_train = diabetes_y[:-20]
diabetes_y_test = diabetes_y[-20:]
regr = linear_model.LinearRegression()
regr.fit(diabetes_X_train, diabetes_y_train)
diabetes_y_pred = regr.predict(diabetes_X_test)
print('Coefficients: \n', regr.coef_)
print('Mean squared error: %.2f' % mean_squared_error(diabetes_y_test,
diabetes_y_pred))
print('Coefficient of determination: %.2f' % r2_score(diabetes_y_test,
diabetes_y_pred)) plt.scatter(diabetes_X_test, diabetes_y_test,
color='black')
plt.plot(diabetes_X_test, diabetes_y_pred, color='blue', linewidth=3)
plt.xticks(())
plt.yticks(())
plt.show()
```

8.Write a program to implement naive bayes classification using iris dataset

```
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import GaussianNB
```

```
X,y=load_iris(return_X_y=True)

X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.5,random_state=0)

gnb=GaussianNB()

y_pred=gnb.fit(X_train,y_train).predict(X_test)

print(y_pred)

x_new=[[5,5,4,4]]

y_new=gnb.fit(X_train,y_train).predict(x_new)

print("predicted output for [[5,5,4,4]]:",y_new)

print("Naive bayes score:",gnb.score(X_test,y_test))
```