EXPERIMENT – 3

Demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

CODE :

```
# Simple ID3 Decision Tree Demonstration


import pandas as pd

import math

# Training data

data = {

   'Outlook': ['Sunny','Sunny','Overcast','Rain'],

   'Humidity': ['High','High','High','Normal'],

   'PlayTennis': ['No','No','Yes','Yes']

}


df = pd.DataFrame(data)

# Entropy function

def entropy(col):

   p = col.value_counts(normalize=True)

   return -sum(p * p.apply(math.log2))


# Information Gain

def info_gain(df, attr):

   total = entropy(df['PlayTennis'])

   values = df[attr].unique()

   w_entropy = 0

   for v in values:

      subset = df[df[attr] == v]

      w_entropy += (len(subset)/len(df)) * entropy(subset['PlayTennis'])
```

```
    return total - w_entropy


print("Information Gain:")
for col in ['Outlook','Humidity']:
    print(col, "=", round(info_gain(df, col), 3))
print("\nRoot Node: Outlook")
new_sample = {'Outlook':'Sunny', 'Humidity':'High'}


if new_sample['Outlook'] == 'Sunny' and new_sample['Humidity'] == 'High':
    result = 'No'
else:
    result = 'Yes'
print("\nNew Sample Classification:", result)
```

OUTPUT :