```
In [1]:
                                from matplotlib import pyplot as plt
   In [2]:
                                import pandas as pd
   In [4]:
                                df=pd.read_csv("C:\\Users\\User\\Desktop\\IRIS.CSV")
   In [5]:
                                df
                                           sepal_length sepal_width petal_length petal_width
   Out[5]:
                                                                                                                                                                                        species
                                    0
                                                                  5.1
                                                                                                   3.5
                                                                                                                                    1.4
                                                                                                                                                                    0.2
                                                                                                                                                                                  Iris-setosa
                                    1
                                                                  4.9
                                                                                                  3.0
                                                                                                                                    1.4
                                                                                                                                                                    0.2
                                                                                                                                                                                   Iris-setosa
                                    2
                                                                  4.7
                                                                                                  3.2
                                                                                                                                    1.3
                                                                                                                                                                    0.2
                                                                                                                                                                                   Iris-setosa
                                    3
                                                                                                   3.1
                                                                                                                                    1.5
                                                                                                                                                                    0.2
                                                                  4.6
                                                                                                                                                                                   Iris-setosa
                                    4
                                                                  5.0
                                                                                                   3.6
                                                                                                                                    1.4
                                                                                                                                                                    0.2
                                                                                                                                                                                   Iris-setosa
                                                                                                                                                                    2.3 Iris-virginica
                              145
                                                                  6.7
                                                                                                  3.0
                                                                                                                                    5.2
                              146
                                                                  6.3
                                                                                                   2.5
                                                                                                                                    5.0
                                                                                                                                                                    1.9 Iris-virginica
                              147
                                                                  6.5
                                                                                                   3.0
                                                                                                                                    5.2
                                                                                                                                                                    2.0 Iris-virginica
                              148
                                                                  6.2
                                                                                                   3.4
                                                                                                                                    5.4
                                                                                                                                                                    2.3 Iris-virginica
                              149
                                                                  5.9
                                                                                                   3.0
                                                                                                                                    5.1
                                                                                                                                                                    1.8 Iris-virginica
                            150 rows × 5 columns
   In [6]:
                                features=df.iloc[:,:-1].values
                                label=df.iloc[:,-1].values
   In [7]:
                                df["species"].value_counts()
                                                                                         50
                              Iris-setosa
                              Iris-versicolor
                                                                                         50
                              Iris-virginica
                                                                                         50
                              Name: species, dtype: int64
   In [8]:
                                from sklearn.model_selection import train_test_split
   In [9]:
                                x_train,x_test,y_train,y_test =train_test_split(features,label)
In [10]:
                                x_train.shape,x_test.shape,y_train.shape,y_test.shape
                              ((112, 4), (38, 4), (112,), (38,))
In [12]:
                                from sklearn.tree import DecisionTreeClassifier
 In [15]:
                                from sklearn.metrics import classification_report
In [16]:
                                dt=DecisionTreeClassifier().fit(features, label)
 In [17]
                                y_pred=dt.predict(x_test)
In [19]:
                                print(classification_report(y_pred,y_test))
                                                                                   precision
                                                                                                                                                                                      support
                                                                                                                           recall f1-score
                                          Iris-setosa
                                                                                                  1.00
                                                                                                                                 1.00
                                                                                                                                                                 1.00
                                                                                                                                                                                                      18
                              Iris-versicolor
                                                                                                  1.00
                                                                                                                                 1.00
                                                                                                                                                                 1.00
                                                                                                                                                                                                         7
                                Iris-virginica
                                                                                                  1.00
                                                                                                                                 1.00
                                                                                                                                                                 1.00
                                                                                                                                                                                                      13
                                                   accuracy
                                                                                                                                                                 1.00
                                                                                                                                                                                                      38
                                                                                                  1.00
                                                                                                                                 1.00
                                                                                                                                                                 1.00
                                                                                                                                                                                                      38
                                                macro avg
                                       weighted avg
                                                                                                  1.00
                                                                                                                                 1.00
                                                                                                                                                                 1.00
                                                                                                                                                                                                      38
In [20]:
                                from sklearn import tree
In [27]:
                                plt.figure(figsize=(50,25))
                                tree.plot_tree(dt.fit(x_train, y_train))
                              [Text(1511.25, 1261.9285714285713, 'X[2] \le 2.45 \cdot gini = 0.662 \cdot gini = 112 \cdot gin
Out[27]:
                                Text(1278.75, 1067.7857142857142, 'gini = 0.0\nsamples = 32\nvalue = [32, 0, 0]'),
                                Text(1743.75, 1067.7857142857142, 'X[3] <= 1.75\ngini = 0.497\nsamples = 80\nvalue = [0, 43, 37]'),
                                Text(1162.5, 873.6428571428571, 'X[2] \le 5.35 \cdot 150 \cdot
                                Text(930.0, 679.5, 'X[0] \le 4.95 = 0.087 = 44 = 44 = [0, 42, 2]'),
                                Text(465.0, 485.3571428571429, 'X[3] \le 1.35 \cdot ngini = 0.5 \cdot nsamples = 2 \cdot nvalue = [0, 1, 1]'),
                                Text(232.5, 291.2142857142858, 'gini = 0.0 \nsamples = 1 \nvalue = [0, 1, 0]'),
                                Text(697.5, 291.2142857142858, 'gini = 0.0 \nsamples = 1 \nvalue = [0, 0, 1]'),
                                Text(1395.0, 485.3571428571429, 'X[2] \le 4.95 = 0.046 = 42 = [0, 41, 1]'),
                                Text(1162.5, 291.2142857142858, 'gini = 0.0\nsamples = 39\nvalue = [0, 39, 0]'),
                                Text(1627.5, 291.2142857142858, 'X[3] \le 1.55 \cdot i = 0.444 \cdot i = 3 \cdot i = 0.444 \cdot i = 0.444
                                Text(1395.0, 97.07142857142867, 'gini = 0.0 \nsamples = 1 \nvalue = [0, 0, 1]'),
                                Text(1860.0, 97.07142857142867, 'gini = 0.0 \nsamples = 2 \nvalue = [0, 2, 0]'),
                                Text(1395.0, 679.5, 'gini = 0.0 \nsamples = 2 \nvalue = [0, 0, 2]'),
                                Text(2325.0, 873.6428571428571, 'X[2] \le 4.85 \cdot i = 0.057 \cdot i = 34 \cdot i = [0, 1, 33]'),
                                Text(2092.5, 679.5, 'X[1] \le 3.1 \le 0.5 \le 2 \le 2 \le [0, 1, 1]'),
                                Text(1860.0, 485.3571428571429, 'gini = 0.0 \nsamples = 1 \nvalue = [0, 0, 1]'),
                                Text(2325.0, 485.3571428571429, 'gini = 0.0\nsamples = 1\nvalue = [0, 1, 0]'),
                                Text(2557.5, 679.5, 'gini = 0.0 \nsamples = 32 \nvalue = [0, 0, 32]')
                                                                                                                                                                                                                                                                                   X[2] \le 2.45
                                                                                                                                                                                                                                                                                     gini = 0.662
                                                                                                                                                                                                                                                                                 samples = 112
                                                                                                                                                                                                                                                                         value = [32, 43, 37]
                                                                                                                                                                                                                                                                                                                             X[3] <= 1.75
                                                                                                                                                                                                                                                 gini = 0.0
                                                                                                                                                                                                                                                                                                                              gini = 0.497
                                                                                                                                                                                                                                         samples = 32
                                                                                                                                                                                                                                                                                                                             samples = 80
                                                                                                                                                                                                                                    value = [32, 0, 0]
                                                                                                                                                                                                                                                                                                                    value = [0, 43, 37]
                                                                                                                                                                                                                      X[2] \le 5.35
                                                                                                                                                                                                                                                                                                                                                                                                                                     X[2] \le 4.85
                                                                                                                                                                                                                                                                                                                                                                                                                                      gini = 0.057
                                                                                                                                                                                                                       gini = 0.159
                                                                                                                                                                                                                     samples = 46
                                                                                                                                                                                                                                                                                                                                                                                                                                    samples = 34
                                                                                                                                                                                                                value = [0, 42, 4]
                                                                                                                                                                                                                                                                                                                                                                                                                              value = [0, 1, 33]
                                                                                                                                                                             X[0] <= 4.95
                                                                                                                                                                                                                                                                                                                                                                                             X[1] \le 3.1
                                                                                                                                                                                                                                                                     gini = 0.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    gini = 0.0
                                                                                                                                                                              gini = 0.087
                                                                                                                                                                                                                                                                                                                                                                                                gini = 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             samples = 32
                                                                                                                                                                                                                                                                 samples = 2
                                                                                                                                                                           samples = 44
                                                                                                                                                                                                                                                                                                                                                                                            samples = 2
                                                                                                                                                                                                                                                           value = [0, 0, 2]
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        value = [0, 0, 32]
                                                                                                                                                                      value = [0, 42, 2]
                                                                                                                                                                                                                                                                                                                                                                                      value = [0, 1, 1]
                                                                                                                                                                                                                                                               X[2] \le 4.95
                                                                                          X[3] <= 1.35
                                                                                                                                                                                                                                                                                                                                                        gini = 0.0
                                                                                                                                                                                                                                                                                                                                                                                                                                          gini = 0.0
                                                                                               gini = 0.5
                                                                                                                                                                                                                                                                 gini = 0.046
                                                                                                                                                                                                                                                                                                                                                   samples = 1
                                                                                                                                                                                                                                                                                                                                                                                                                                      samples = 1
                                                                                           samples = 2
                                                                                                                                                                                                                                                              samples = 42
                                                                                                                                                                                                                                                                                                                                              value = [0, 0, 1]
                                                                                                                                                                                                                                                                                                                                                                                                                                value = [0, 1, 0]
                                                                                     value = [0, 1, 1]
                                                                                                                                                                                                                                                         value = [0, 41, 1]
                                                                                                                                                                                                                                                                                                         X[3] <= 1.55
                                                      gini = 0.0
                                                                                                                                         gini = 0.0
                                                                                                                                                                                                                            gini = 0.0
                                                                                                                                                                                                                                                                                                         gini = 0.444
                                                                                                                                    samples = 1
                                                  samples = 1
                                                                                                                                                                                                                     samples = 39
                                                                                                                                                                                                                                                                                                         samples = 3
                                            value = [0, 1, 0]
                                                                                                                               value = [0, 0, 1]
                                                                                                                                                                                                                value = [0, 39, 0]
                                                                                                                                                                                                                                                                                                    value = [0, 2, 1]
                                                                                                                                                                                                                                                                                                                                                        gini = 0.0
                                                                                                                                                                                                                                                                     gini = 0.0
                                                                                                                                                                                                                                                                 samples = 1
                                                                                                                                                                                                                                                                                                                                                   samples = 2
                                                                                                                                                                                                                                                           value = [0, 0, 1]
                                                                                                                                                                                                                                                                                                                                              value = [0, 2, 0]
   In [ ]:
```