In [ ]:

```
# Load libraries and dataset
import seaborn as sns
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
import matplotlib.pyplot as plt

# Load Titanic dataset from seaborn
df = sns.load_dataset('titanic')

# print head
df.head()
# test = df['class']
# print(test)
```

Out[ ]:

| | survived | pclass | sex | age | sibsp | parch | fare | embarked | class | who | adult_m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 3 | male | 22.0 | 1 | 0 | 7.2500 | S | Third | man | T |
| **1** | 1 | 1 | female | 38.0 | 1 | 0 | 71.2833 | C | First | woman | Fa |
| **2** | 1 | 3 | female | 26.0 | 0 | 0 | 7.9250 | S | Third | woman | Fa |
| **3** | 1 | 1 | female | 35.0 | 1 | 0 | 53.1000 | S | First | woman | Fa |
| **4** | 0 | 3 | male | 35.0 | 0 | 0 | 8.0500 | S | Third | man | T |

In [2]:

```
# Drop not needed columns
df = df.drop(columns=['pclass', 'embark_town', 'deck', 'adult_male', 'alone','fare'
# Drop rows where 'age' is missing
df = df.dropna(subset=['age'])

df.head()
```

Out[2]:

| | survived | sex | age | sibsp | parch | class |
|---|---|---|---|---|---|---|
| **0** | 0 | male | 22.0 | 1 | 0 | Third |
| **1** | 1 | female | 38.0 | 1 | 0 | First |
| **2** | 1 | female | 26.0 | 0 | 0 | Third |
| **3** | 1 | female | 35.0 | 1 | 0 | First |
| **4** | 0 | male | 35.0 | 0 | 0 | Third |

In [3]:

```
# feature: sex, age, class, family_size
# target = alive
```

In [4]:

```
d = {'First': 1, 'Second': 2, 'Third': 3} # assign numerical values to class
df['class'] = df['class'].map(d)
df.head()
```

Out[4]:

|   | survived | sex | age | sibsp | parch | class |
|---|---|---|---|---|---|---|
| **0** | 0 | male | 22.0 | 1 | 0 | 3 |
| **1** | 1 | female | 38.0 | 1 | 0 | 1 |
| **2** | 1 | female | 26.0 | 0 | 0 | 3 |
| **3** | 1 | female | 35.0 | 1 | 0 | 1 |
| **4** | 0 | male | 35.0 | 0 | 0 | 3 |

In [5]:

```
df['family_size'] = df['sibsp'] + df['parch']
df = df.drop(columns=['sibsp', 'parch'], errors='ignore')
df.head(10)
```

Out[5]:

|   | survived | sex | age | class | family_size |
|---|---|---|---|---|---|
| **0** | 0 | male | 22.0 | 3 | 1 |
| **1** | 1 | female | 38.0 | 1 | 1 |
| **2** | 1 | female | 26.0 | 3 | 0 |
| **3** | 1 | female | 35.0 | 1 | 1 |
| **4** | 0 | male | 35.0 | 3 | 0 |
| **6** | 0 | male | 54.0 | 1 | 0 |
| **7** | 0 | male | 2.0 | 3 | 4 |
| **8** | 1 | female | 27.0 | 3 | 2 |
| **9** | 1 | female | 14.0 | 2 | 1 |
| **10** | 1 | female | 4.0 | 3 | 2 |

In [6]:

```
# 1 = man, 2 = woman
d = {'male': 1, 'female': 2} # assign numerical values to sex
df['sex'] = df['sex'].map(d)
df.head()
```

Out[6]:

|   | survived | sex | age | class | family_size |
|---|---|---|---|---|---|
| **0** | 0 | 1 | 22.0 | 3 | 1 |
| **1** | 1 | 2 | 38.0 | 1 | 1 |
| **2** | 1 | 2 | 26.0 | 3 | 0 |
| **3** | 1 | 2 | 35.0 | 1 | 1 |
| **4** | 0 | 1 | 35.0 | 3 | 0 |

In [7]:

```
# Define a function to categorize ages
def categorize_age(age): # 1 = child, 2 = teen, 3 = young adult, 4 = adult, 5 = sen
```

```
    if age < 12:
        return 1
    elif age < 19:
        return 2
    elif age < 35:
        return 3
    elif age < 60:
        return 4
    else:
        return 5

# Apply the function to create the 'age_group' column
df['age_group'] = df['age'].apply(categorize_age)

# Drop the original 'age' column
df = df.drop(columns='age', errors='ignore')

# Show the first 10 rows
df.head(10)
```

Out[7]:

| | survived | sex | class | family_size | age_group |
|---|---|---|---|---|---|
| **0** | 0 | 1 | 3 | 1 | 3 |
| **1** | 1 | 2 | 1 | 1 | 4 |
| **2** | 1 | 2 | 3 | 0 | 3 |
| **3** | 1 | 2 | 1 | 1 | 4 |
| **4** | 0 | 1 | 3 | 0 | 4 |
| **6** | 0 | 1 | 1 | 0 | 4 |
| **7** | 0 | 1 | 3 | 4 | 1 |
| **8** | 1 | 2 | 3 | 2 | 3 |
| **9** | 1 | 2 | 2 | 1 | 2 |
| **10** | 1 | 2 | 3 | 2 | 1 |

In [8]:

```
features = ['sex', 'age_group', 'class', 'family_size']

X = df[features]
y = df['survived']

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_sta
```

In [9]:

```
# Initialize the decision tree classifier
dtree = DecisionTreeClassifier(max_depth=5, criterion="entropy")

# Fit the model on the training data
dtree.fit(X_train, y_train)

# Make predictions on the test data
```

```
y_pred = dtree.predict(X_test)
```

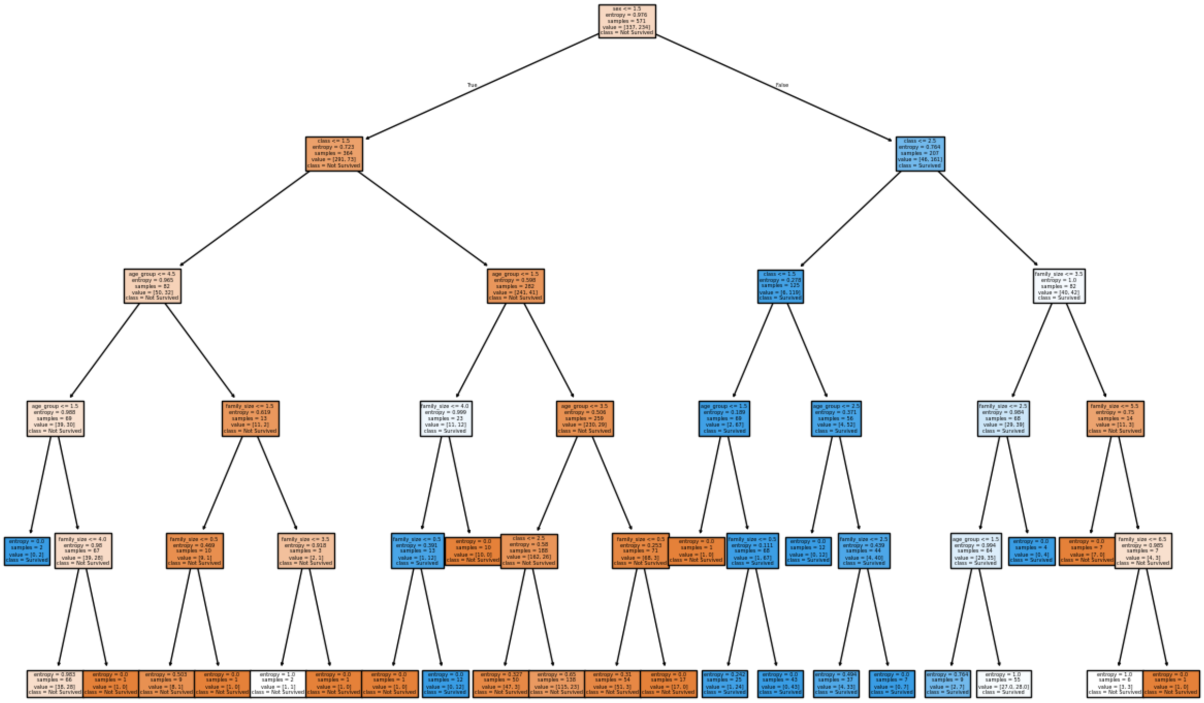
In [10]:

```
# Calculate accuracy
accuracy = accuracy_score(y_test, y_pred)
print(f"Accuracy: {accuracy:.2f}")

# Generate a classification report
print("Classification Report:")
print(classification_report(y_test, y_pred))

# Display the confusion matrix
print("Confusion Matrix:")
print(confusion_matrix(y_test, y_pred))
```

```
Accuracy: 0.81
Classification Report:
              precision    recall  f1-score   support

           0       0.83      0.86      0.85        87
           1       0.77      0.73      0.75        56

    accuracy                           0.81       143
   macro avg       0.80      0.80      0.80       143
weighted avg       0.81      0.81      0.81       143

Confusion Matrix:
[[75 12]
 [15 41]]
```

In [11]:

```
plt.figure(figsize=(15, 10)) # make picture bigger
plot_tree(dtree, feature_names=['sex', 'age_group', 'class', 'family_size'], class_
plt.show()
```



In [ ]:

```
# Create input data as a DataFrame with a single row
input_data = pd.DataFrame([[2,  # 1 = man, 2 = woman
                            3,  # 1 = child, 2 = teen, 3 = young adult, 4 = adult,
                            3,  # class 1st 2nd or 3rd
                            2   # family size
                            ]],
                          columns=['sex', 'age_group', 'class', 'family_size'])

# Make the prediction and get the probabilities
prediction_probabilities = dtree.predict_proba(input_data)

# made by chatgbt
predicted_class = dtree.predict(input_data)[0]
confidence = prediction_probabilities[0][predicted_class]

print(f"Prediction: {'Survived.' if predicted_class == 1 else 'Did not survive.'} C
```

```
Prediction: Survived. Confidence: 0.78
```