In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df=pd.read_csv("C10_loan1.csv")
df
```

Out[2]:

	Home Owner	Marital Status	Annual Income	Defaulted Borrower
0	Yes	Single	125	No
1	No	Married	100	No
2	No	Single	70	No
3	Yes	Married	120	No
4	No	Divorced	95	Yes
5	No	Married	60	No
6	Yes	Divorced	220	No
7	No	Single	85	Yes
8	No	Married	75	No
9	No	Single	90	Yes

In [3]:
```
df['Defaulted Borrower'].value_counts()
```

Out[3]:
```
No     7
Yes    3
Name: Defaulted Borrower, dtype: int64
```

In [4]:
```
x=df[['Annual Income','Annual Income']]
y=df['Defaulted Borrower']
```

In [5]:
```
g1={"'Defaulted Borrower'":{"Yes":1,"No":2}}
df=df.replace(g1)
df
```

Out[5]:

	Home Owner	Marital Status	Annual Income	Defaulted Borrower
0	Yes	Single	125	No
1	No	Married	100	No
2	No	Single	70	No
3	Yes	Married	120	No
4	No	Divorced	95	Yes
5	No	Married	60	No

	Home Owner	Marital Status	Annual Income	Defaulted Borrower
6	Yes	Divorced	220	No
7	No	Single	85	Yes
8	No	Married	75	No
9	No	Single	90	Yes

In [6]:
```
from sklearn.model_selection import train_test_split
```

In [7]:
```
x_train,x_test,y_train,y_test=train_test_split(x,y,train_size=0.70)
```

In [8]:
```
from sklearn.ensemble import RandomForestClassifier
```

In [9]:
```
rfc=RandomForestClassifier()
rfc.fit(x_train,y_train)
```

Out[9]:
```
RandomForestClassifier()
```

In [10]:
```
parameters={'max_depth':[1,2,3,4,5],
            'min_samples_leaf':[5,10,15,20,25],
            'n_estimators':[10,20,30,40,50]
}
```

In [11]:
```
from sklearn.model_selection import GridSearchCV
grid_search =GridSearchCV(estimator=rfc,param_grid=parameters,cv=2,scoring="accuracy")
grid_search.fit(x_train,y_train)
```

Out[11]:
```
GridSearchCV(cv=2, estimator=RandomForestClassifier(),
             param_grid={'max_depth': [1, 2, 3, 4, 5],
                         'min_samples_leaf': [5, 10, 15, 20, 25],
                         'n_estimators': [10, 20, 30, 40, 50]},
             scoring='accuracy')
```

In [12]:
```
grid_search.best_score_
```

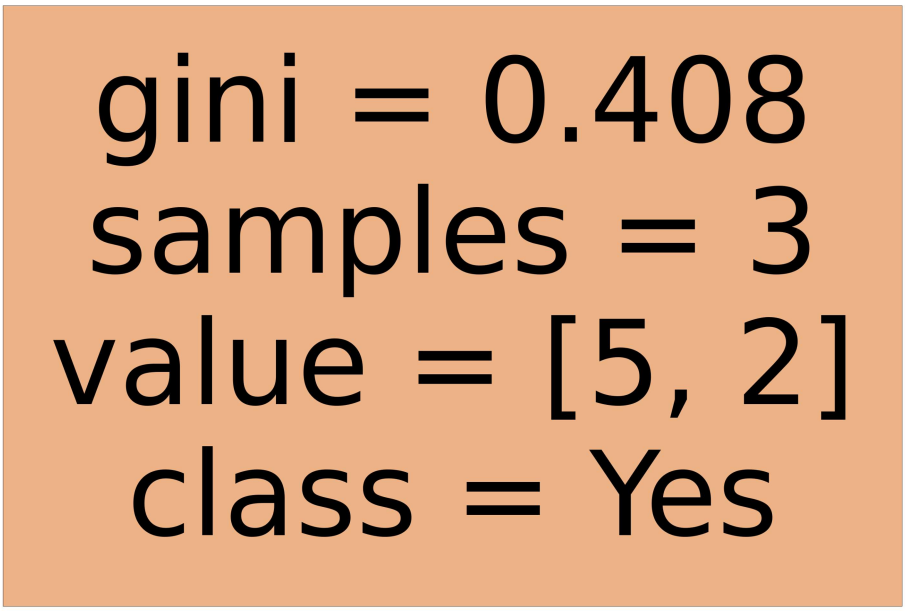
Out[12]:
```
0.5833333333333333
```

In [13]:
```
rfc_best=grid_search.best_estimator_
```

In [14]:
```
from sklearn.tree import plot_tree

plt.figure(figsize=(80,40))
plot_tree(rfc_best.estimators_[5],feature_names=x.columns,class_names=['Yes','No'],fill
```

Out[14]:
```
[Text(2232.0, 1087.2, 'gini = 0.408\nsamples = 3\nvalue = [5, 2]\nclass = Yes')]
```


gini = 0.408
samples = 3
value = [5, 2]
class = Yes