In [18]:
```
import pandas as pd
df=pd.read_csv('Social_Network_Ads.csv')
df.head()
```

Out[18]:

	Age	EstimatedSalary	Purchased
0	19	19000	0
1	35	20000	0
2	26	43000	0
3	27	57000	0
4	19	76000	0

In [19]:
```
df.describe()
```

Out[19]:

	Age	EstimatedSalary	Purchased
count	400.000000	400.000000	400.000000
mean	37.655000	69742.500000	0.357500
std	10.482877	34096.960282	0.479864
min	18.000000	15000.000000	0.000000
25%	29.750000	43000.000000	0.000000
50%	37.000000	70000.000000	0.000000
75%	46.000000	88000.000000	1.000000
max	60.000000	150000.000000	1.000000

In [20]:
```
df.info()
```

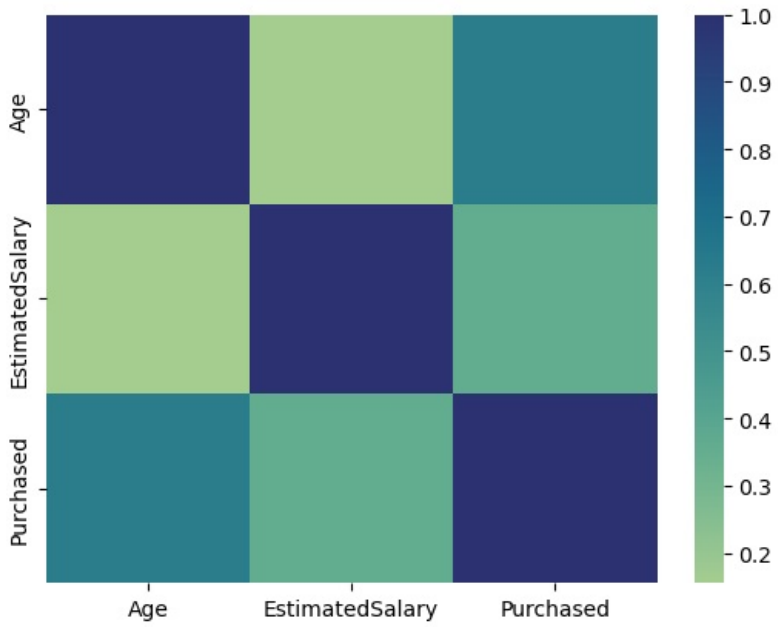
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 3 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   Age              400 non-null    int64
 1   EstimatedSalary  400 non-null    int64
 2   Purchased        400 non-null    int64
dtypes: int64(3)
memory usage: 9.5 KB
```

In [21]:
```
df.isnull().sum()
```

Out[21]:
```
Age                0
EstimatedSalary    0
Purchased          0
dtype: int64
```

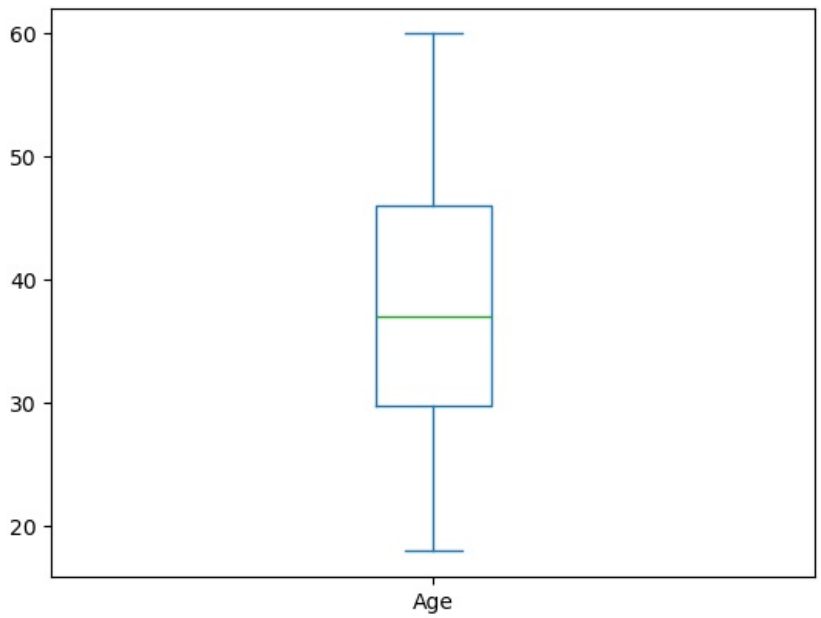
In [59]:
```
import seaborn as sns
correaltion_matrix=df.corr()
sns.heatmap(data=correaltion_matrix,cmap="crest")
```

Out[59]:
```
<Axes: >
```



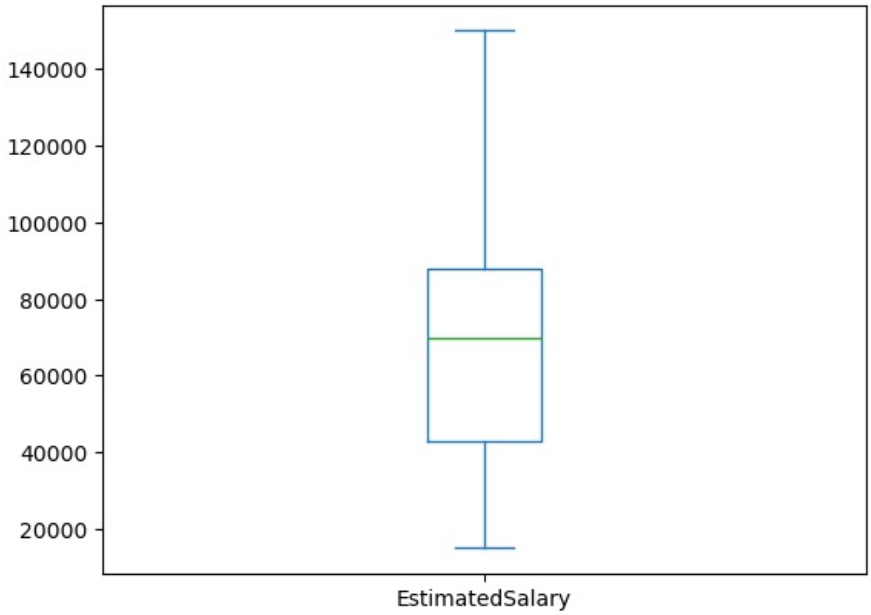
In [23]:
```
df['Age'].plot.box()
```

Out[23]: <Axes: >



In [24]:
```
df['EstimatedSalary'].plot.box()
```

Out[24]: <Axes: >



In [25]:
```
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
```

In [26]:
```
x=df.loc[:,['Age','EstimatedSalary']].values
y=df['Purchased'].values
```

Splitting the data

In [32]:
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2)
```

In [33]:
```
#Normalization using scalar transform
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
x_train = sc.fit_transform(x_train)
x_test = sc.transform(x_test)
```

In [34]:
```
x_train
```

Out[34]:
```
array([[ 0.40019617, -0.12806124],
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```

```
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```

In [36]:
```
model=LogisticRegression()
model.fit(x_train,y_train)
```

Out[36]:
```
▾ LogisticRegression
LogisticRegression()
```

In [37]:
```
y_pred=model.predict(x_test)
print(y_pred)
```

```
[0 0 0 1 0 0 1 0 1 0 0 1 0 0 0 1 0 0 0 0 0 0 0 1 0 0 1 0 0 1 1 0 0 1 0 0 0
 0 1 0 1 1 0 0 1 0 0 0 1 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0
 0 0 0 0 0 1]
```

In [38]:
```
import numpy as np
#comparing acutal and predicted value side by side
y_comp=np.vstack((y_test,y_pred))
y_comp
```

Out[38]:
```
array([[0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0,
        0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0,
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        1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1]], dtype=int64)
```

In [45]:
```
mse=mean_squared_error(y_test,y_pred)
mse
```

Out[45]: 0.175

In [46]:
```
import numpy as np
rmse=np.sqrt(mse)
rmse
```

Out[46]: 0.4183300132670378

In [47]:
```
r2_score=model.score(x_test,y_test)
r2_score
```

Out[47]: 0.825

Confusion matrix

In [39]:
```
from sklearn.metrics import confusion_matrix
cm=confusion_matrix(y_test,y_pred)
cm
```

Out[39]:
```
array([[48,  3],
       [11, 18]], dtype=int64)
```

In [40]:
```
print('TN',cm[0,0])
print('FP',cm[0,1])
print('FN',cm[1,0])
print('TP',cm[1,1])
```

```
TN 48
FP 3
FN 11
TP 18
```

In [61]:
```
from sklearn import metrics
fpr, tpr, threshold = metrics.roc_curve(y_test, y_pred)
print('The accuracy value : ', metrics.auc(fpr, tpr))
```

```
The accuracy value :  0.7809330628803245
```

In [62]:
```
from sklearn.metrics import average_precision_score
print('The Average Precision score: ',average_precision_score(y_test, y_pred) )
```

```
The Average Precision score:  0.6695197044334975
```

In [63]:
```
from sklearn.metrics import mean_squared_error
mse = mean_squared_error(y_test, y_pred)
print('The mean square error :',mse)
```

```
The mean square error : 0.175
```