In [9]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [10]:

```
data = pd.read_csv("housing.csv", delimiter=r"\s+", header=None)
data.head()
```

Out[10]:

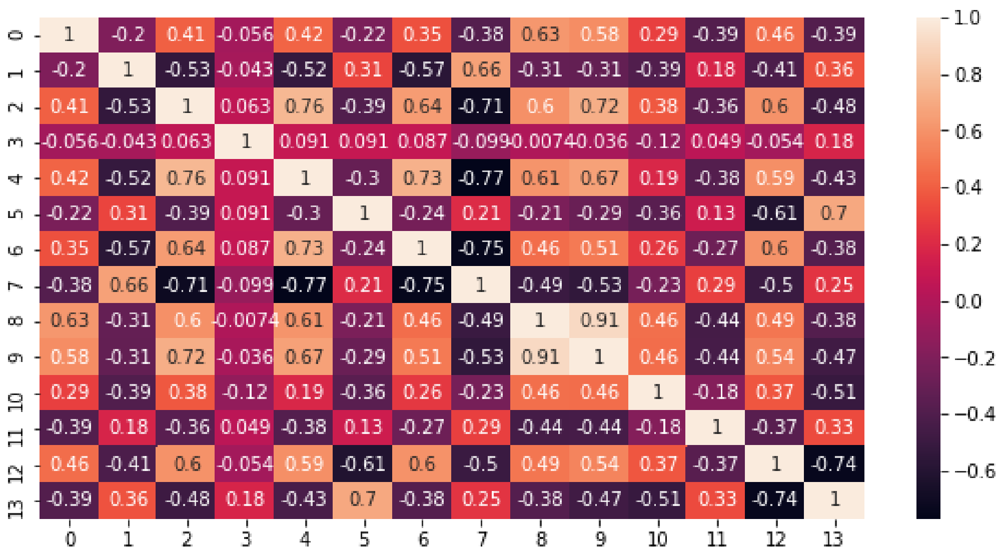
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296.0	15.3	396.90	4.98	24.0
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242.0	17.8	396.90	9.14	21.6
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242.0	17.8	392.83	4.03	34.7
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222.0	18.7	394.63	2.94	33.4
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222.0	18.7	396.90	5.33	36.2

In [13]:

```
import seaborn as sns
corr_matrix = data.corr()
plt.figure(figsize=(10,5))
sns.heatmap(corr_matrix, annot=True)
```

Out[13]:

```
<AxesSubplot:>
```



i am plotting corelation matrix of data and i found that the 5th column i.e, rm average number of rooms per dwelling has a strong corelation of 0.7 with the 13th column that is medv median value of owner-occupied homes in $1000s. So i am picking 5th column to predict 13th column

In [38]:

```
X = data.iloc[:,5]
y = data.iloc[:,13]
```

In [18]:

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

```
x_train, x_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=1)
```

In [21]:

```
reg = LinearRegression()
reg.fit(x_train.values.reshape(-1,1),y_train)
```

Out[21]:

```
LinearRegression()
```

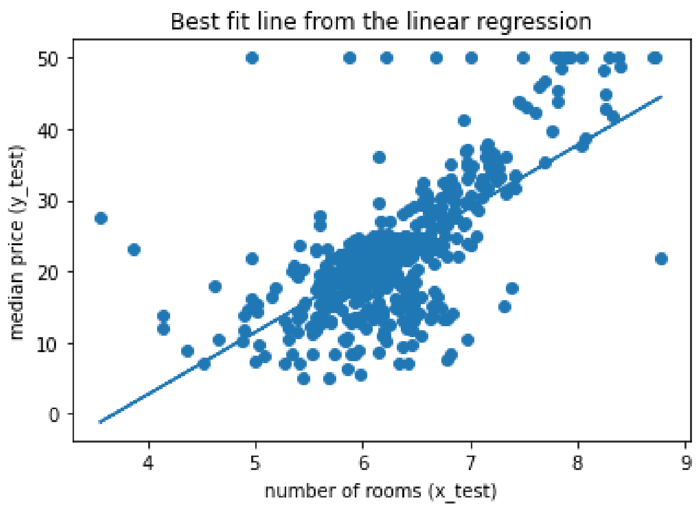
In [26]:

```
from sklearn.metrics import mean_squared_error, r2_score

y_pred = reg.predict(x_test.values.reshape(-1,1))
rmse_Score = mean_squared_error(y_test,y_pred, squared=False)
r2_Score = r2_score(y_test,y_pred)

print("rmse score of the data: ", rmse_Score)
print("r2 score of the data: ", r2_Score)
```

```
rmse score of the data:  6.383135112649168
r2 score of the data:  0.5877214395051774
```

In [52]:

```
y_predicted = reg.predict(X.values.reshape(-1,1))
plt.scatter(X,y)
plt.plot(X,y_predicted)
plt.title("Best fit line from the linear regression")
plt.xlabel("number of rooms (x_test)")
plt.ylabel("median price (y_test)")
plt.show()
```



In [122]:

```
from sklearn.preprocessing import PolynomialFeatures

poly = PolynomialFeatures(degree=2)
X_poly = poly.fit_transform(X.values.reshape(-1,1))
```

In [123]:

```
X_poly.shape
```

Out[123]:

```
(506, 3)
```

In [124]:

```
x_train, x_test, y_train, y_test = train_test_split(X_poly, y, test_size=0.2, random_sta
te=1)
```

In [125]:

```
reg_poly = LinearRegression()
reg_poly.fit(x_train,y_train)
```

Out[125]:

```
LinearRegression()
```

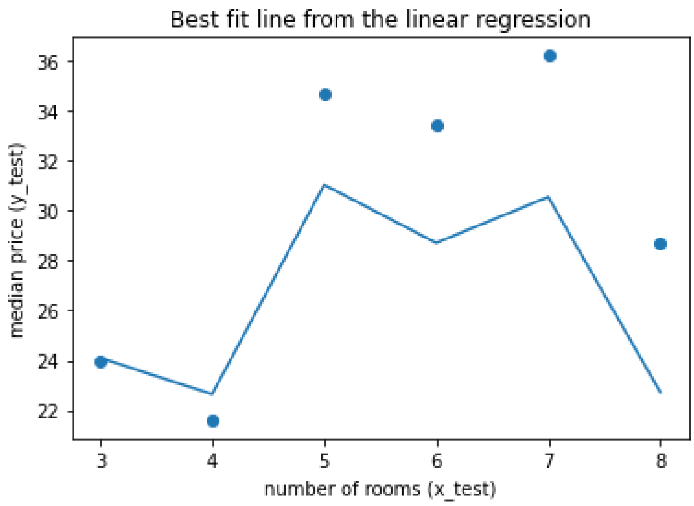
In [126]:

```
y_pred = reg_poly.predict(x_test)
rmse_Score_poly = mean_squared_error(y_test,y_pred, squared=False)
r2_Score_poly = r2_score(y_test,y_pred)

print("rmse score of the data: ", rmse_Score_poly)
print("r2 score of the data: ", r2_Score_poly)
```

```
rmse score of the data:  5.799858200692183
r2 score of the data:  0.6596251774934456
```

In [127]:

```
y_predicted = reg_poly.predict(X_poly)
x_space = np.arange(3, 9, 1)
plt.scatter(x_space,y[0:6])
plt.plot(x_space,y_predicted[0:6])
plt.title("Best fit line from the linear regression")
plt.xlabel("number of rooms (x_test)")
plt.ylabel("median price (y_test)")
plt.show()
```



In [128]:

```
poly_20 = PolynomialFeatures(degree=20)
X_poly_20 = poly.fit_transform(X.values.reshape(-1,1))
```

In [129]:

```
x_train, x_test, y_train, y_test = train_test_split(X_poly_20, y, test_size=0.2, random_
state=1)
```

In [130]:

```
reg_poly_20 = LinearRegression()
reg_poly_20.fit(x_train,y_train)
```

Out[130]:

```
LinearRegression()
```

In [131]:

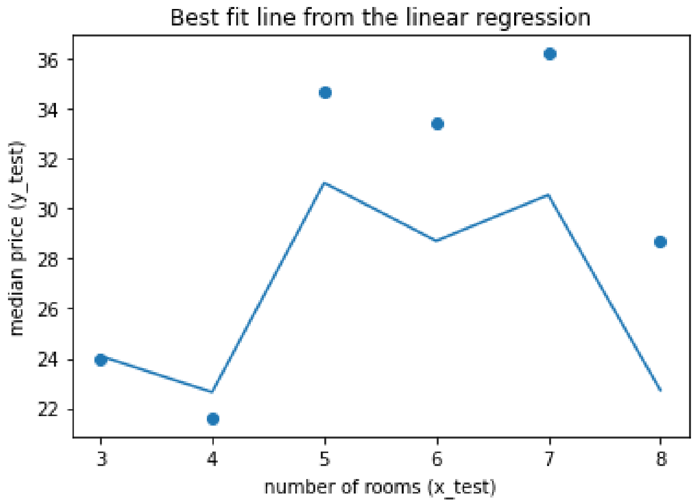
```
y_pred = reg_poly_20.predict(x_test)
```

```
rmse_Score_poly_20 = mean_squared_error(y_test,y_pred, squared=False)
r2_Score_poly_20 = r2_score(y_test,y_pred)

print("rmse score of the data: ", rmse_Score_poly_20)
print("r2 score of the data: ", r2_Score_poly_20)
```

```
rmse score of the data:  5.799858200692183
r2 score of the data:  0.6596251774934456
```

In [132]:

```
y_predicted = reg_poly_20.predict(X_poly_20)
x_space = np.arange(3, 9, 1)
plt.scatter(x_space,y[0:6])
plt.plot(x_space,y_predicted[0:6])
plt.title("Best fit line from the linear regression")
plt.xlabel("number of rooms (x_test)")
plt.ylabel("median price (y_test)")
plt.show()
```



In [112]:

```
x_multiple = data.iloc[:,[5,11,12]]
y = data.iloc[:,13]
```

In [114]:

```
x_train, x_test, y_train, y_test = train_test_split(x_multiple, y, test_size=0.2, random
_state=1)
reg_multiple = LinearRegression()
reg_multiple.fit(x_train,y_train)
```

Out[114]:

```
LinearRegression()
```

In [117]:

```
y_pred = reg_multiple.predict(x_test)
rmse_Score_multiple = mean_squared_error(y_test,y_pred, squared=False)
r2_Score_multiple = r2_score(y_test,y_pred)

print("rmse score of the data: ", rmse_Score_multiple)
print("r2 score of the data: ", r2_Score_multiple)
```

```
rmse score of the data:  5.474914616536909
r2 score of the data:  0.6966965309874333
```