In [153]:

```
import pandas as pd
import sklearn
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import linear_model
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import PolynomialFeatures
from sklearn.model_selection import train_test_split
import statsmodels.api as sm
matplotlib.style.use('bmh')
```

In [154]:

```
data=pd.read_csv('kc_house_data.csv')
data
```

Out[154]:

	id	date	price	bedrooms	bathrooms	sqft_living	sqft_lot
0	7129300520	20141013T000000	221900.0	3	1.00	1180	5650
1	6414100192	20141209T000000	538000.0	3	2.25	2570	7242
2	5631500400	20150225T000000	180000.0	2	1.00	770	10000
3	2487200875	20141209T000000	604000.0	4	3.00	1960	5000
4	1954400510	20150218T000000	510000.0	3	2.00	1680	8080
...	...	...	...	...	...	...	...
21608	263000018	20140521T000000	360000.0	3	2.50	1530	1131
21609	6600060120	20150223T000000	400000.0	4	2.50	2310	5813
21610	1523300141	20140623T000000	402101.0	2	0.75	1020	1350
21611	291310100	20150116T000000	400000.0	3	2.50	1600	2388
21612	1523300157	20141015T000000	325000.0	2	0.75	1020	1076

21613 rows × 21 columns

In [155]:

```
#пропущеные значения
for col in data.columns:
    pct_missing = np.mean(data[col].isnull())
    print('{} - {}%'.format(col, round(pct_missing*100)))
```

```
id - 0.0%
date - 0.0%
price - 0.0%
bedrooms - 0.0%
bathrooms - 0.0%
sqft_living - 0.0%
sqft_lot - 0.0%
floors - 0.0%
waterfront - 0.0%
view - 0.0%
condition - 0.0%
grade - 0.0%
sqft_above - 0.0%
sqft_basement - 0.0%
yr_built - 0.0%
yr_renovated - 0.0%
zipcode - 0.0%
lat - 0.0%
long - 0.0%
sqft_living15 - 0.0%
sqft_lot15 - 0.0%
```

In [156]:

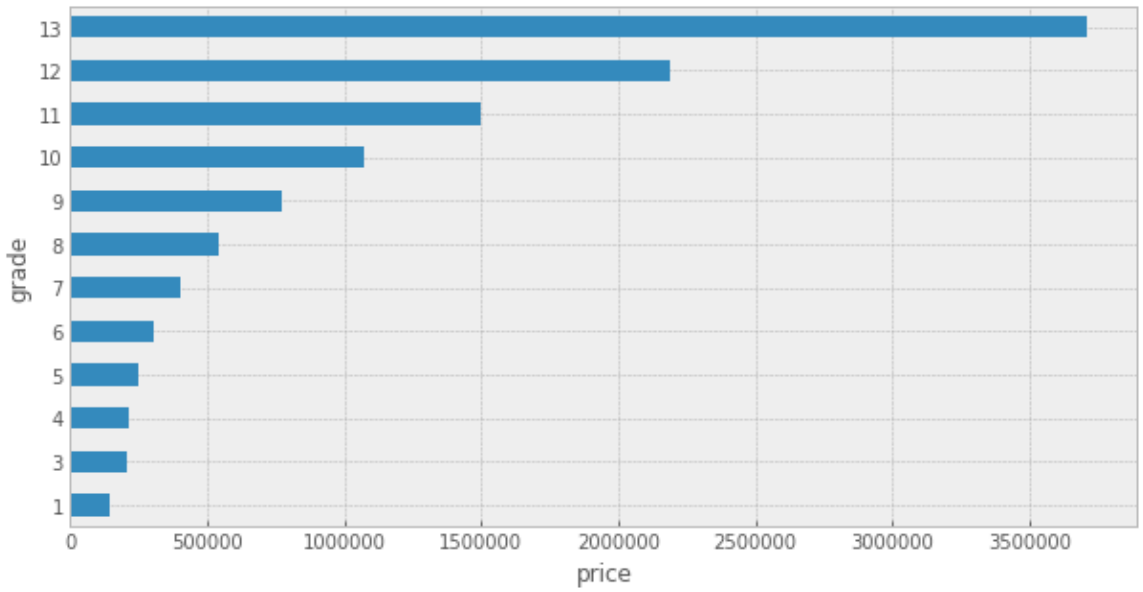
```
data.nunique()
```

Out[156]:

```
id               21436
date               372
price             4028
bedrooms            13
bathrooms           30
sqft_living       1038
sqft_lot          9782
floors               6
waterfront           2
view                 5
condition            5
grade               12
sqft_above         946
sqft_basement      306
yr_built           116
yr_renovated        70
zipcode             70
lat               5034
long               752
sqft_living15      777
sqft_lot15        8689
dtype: int64
```

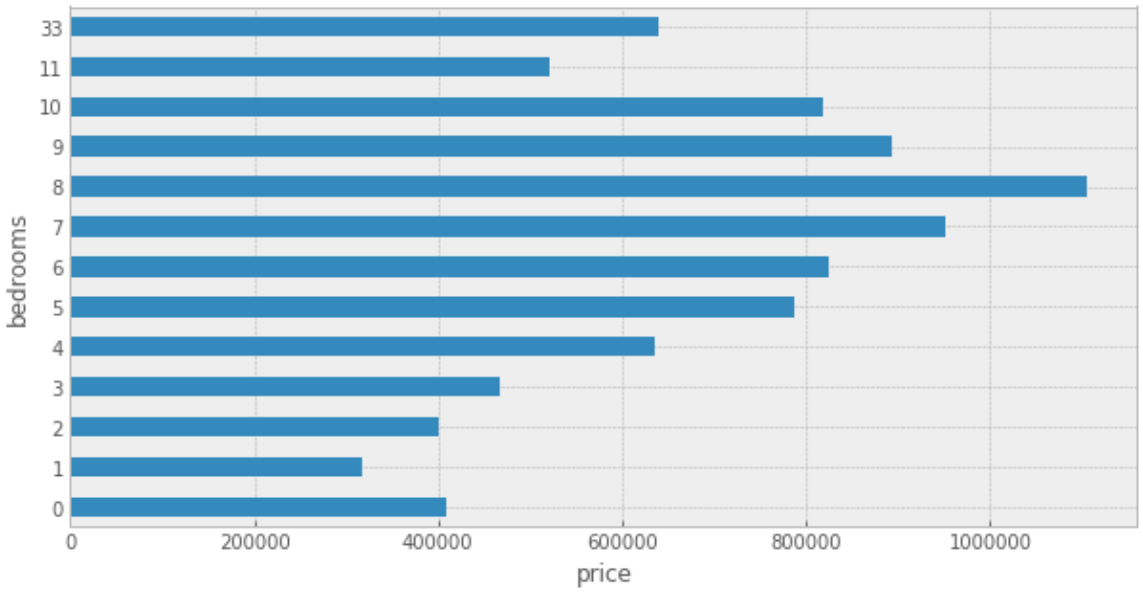
In [157]:

```
#класс/цена
groups = data.groupby(['grade'])['price'].mean()
plt.figure(figsize=(10, 5))
plt.xlabel('price')
groups.plot.barh()
plt.show()
```



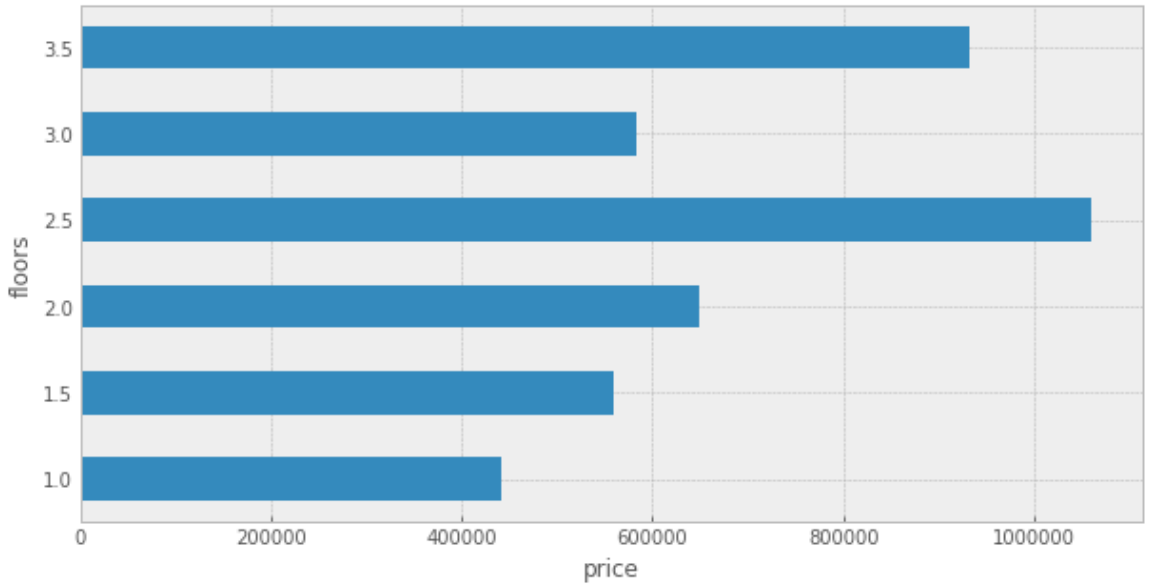
In [158]:

```
# спални/цена
groups = data.groupby(['bedrooms'])['price'].mean()
plt.figure(figsize=(10, 5))
plt.xlabel('price')
groups.plot.barh()
plt.show()
```



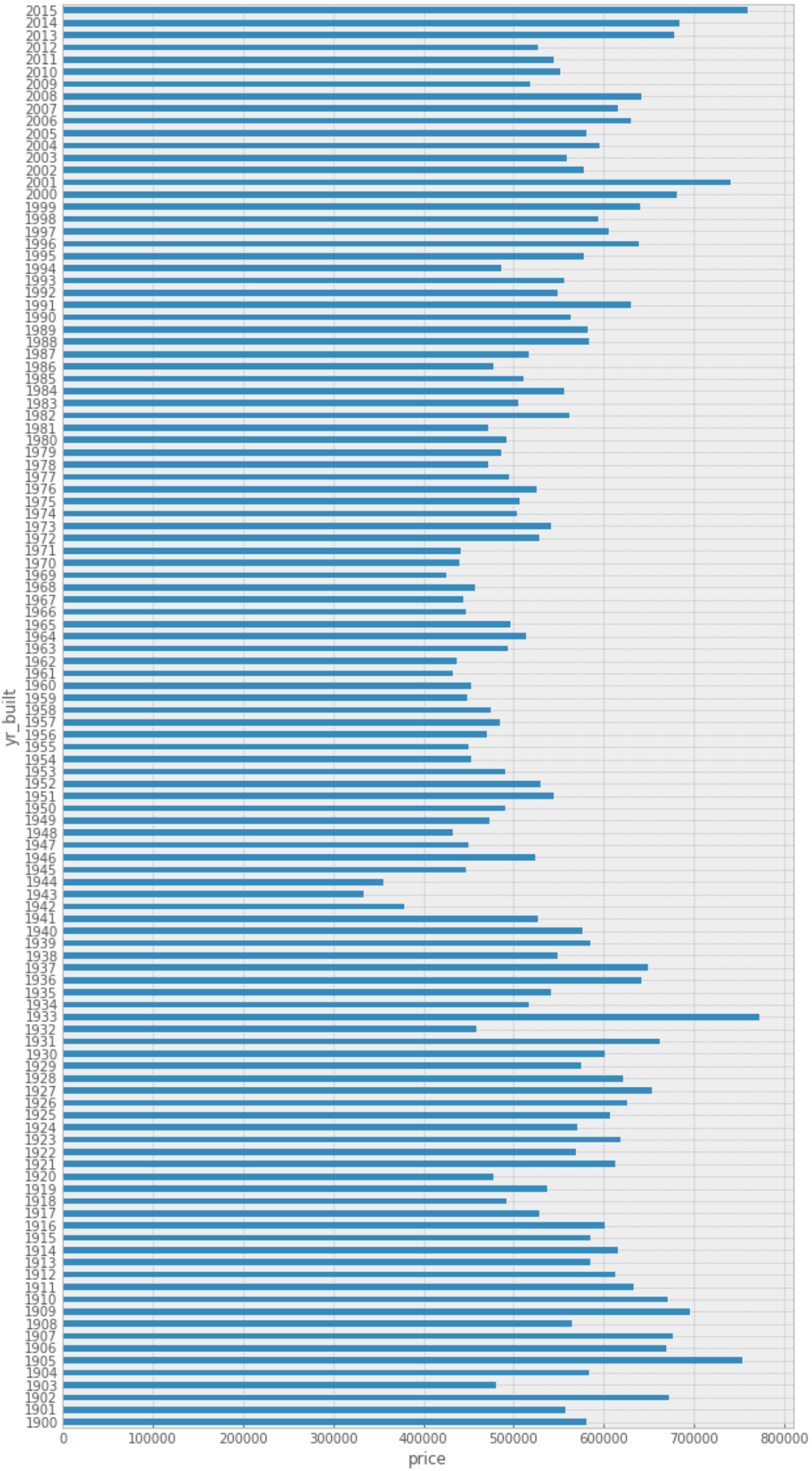
In [159]:

```
# этажи/цена
groups = data.groupby(['floors'])['price'].mean()
plt.figure(figsize=(10, 5))
plt.xlabel('price')
groups.plot.barh()
plt.show()
```



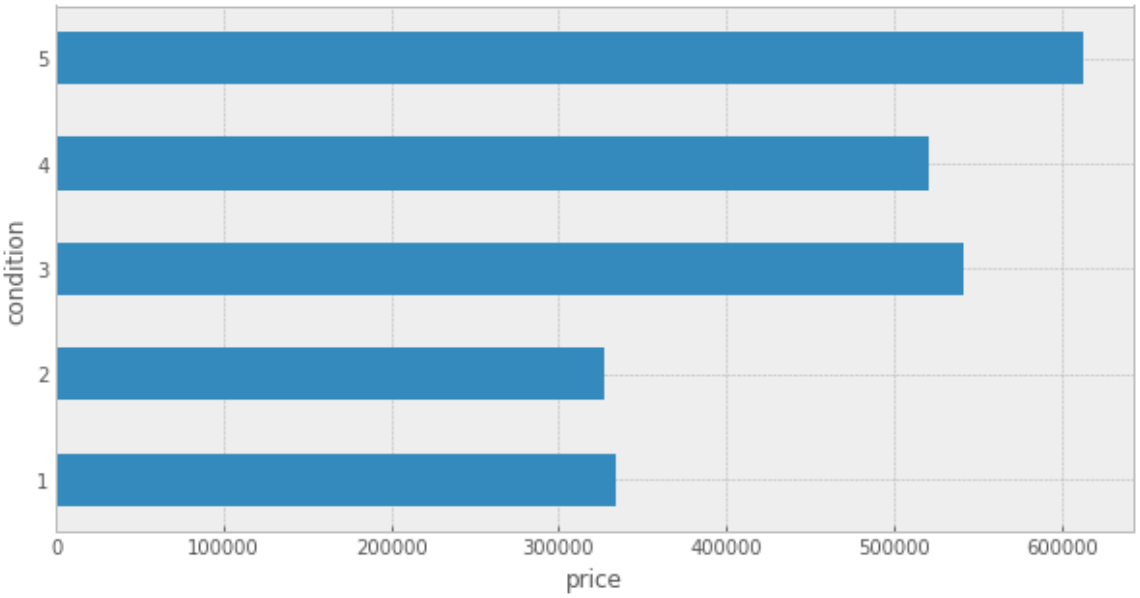
In [160]:

```
# год_постройки/цена
groups = data.groupby(['yr_built'])['price'].mean()
plt.figure(figsize=(10, 20))
plt.xlabel('price')
groups.plot.barh()
plt.show()
```


yr_built
price
0
100000
200000
300000
400000
500000
600000
700000
800000

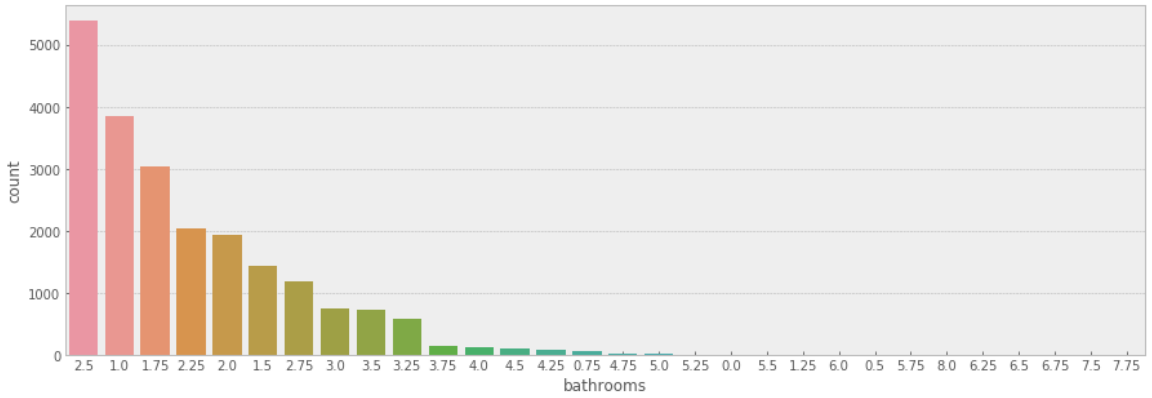
In [175]:

```
#состояние/цена
groups = data.groupby(['condition'])['price'].mean()
plt.figure(figsize=(10, 5))
plt.xlabel('price')
groups.plot.barh()
plt.show()
```



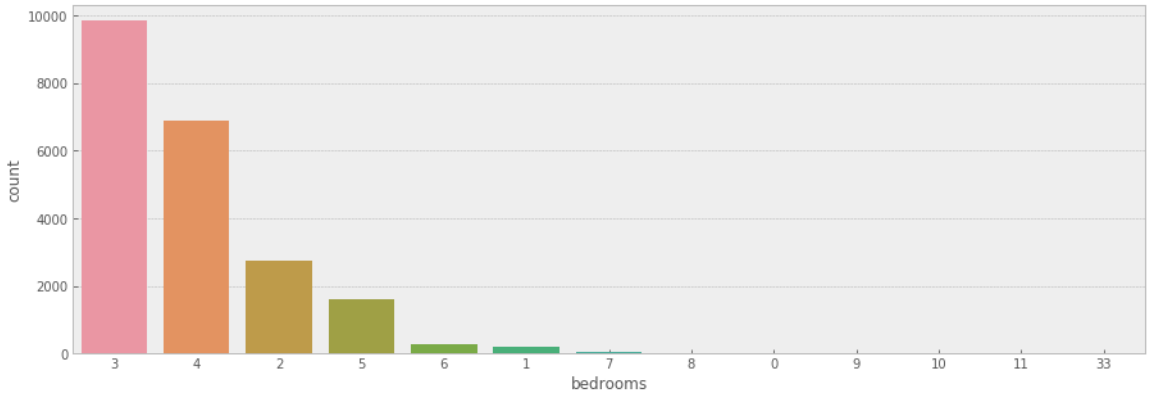
In [161]:

```
# кол-во ванных
plt.figure(figsize=(15, 5))
sns.countplot(data.bathrooms, order = data['bathrooms'].value_counts().index)
plt.show()
```



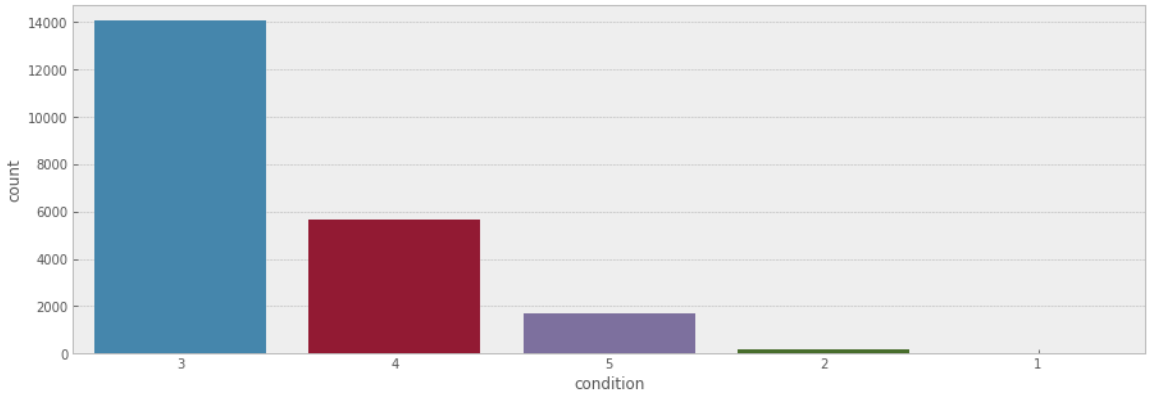
In [162]:

```
# кол-во спалень
plt.figure(figsize=(15, 5))
sns.countplot(data.bedrooms, order = data['bedrooms'].value_counts().index)
plt.show()
```



In [163]:

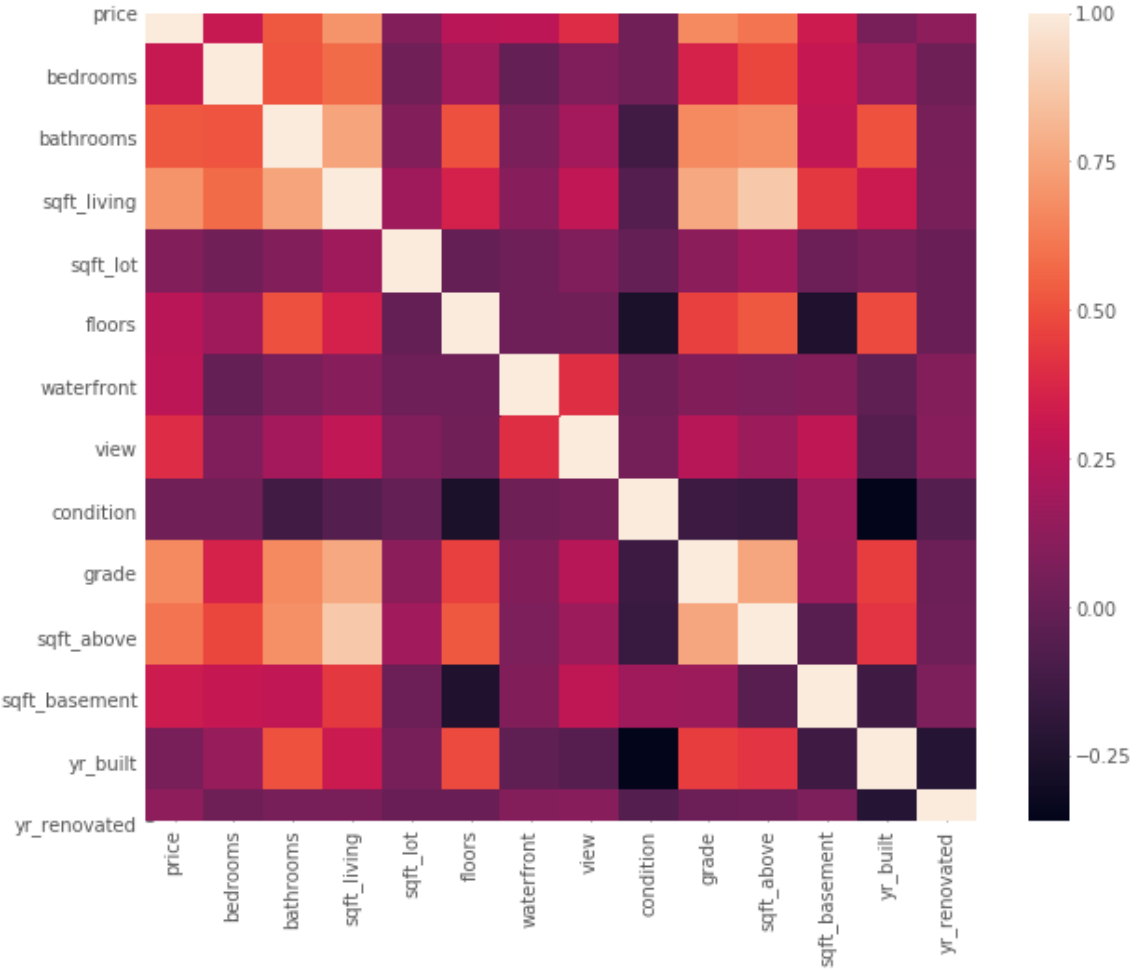
```
# состояние
plt.figure(figsize=(15, 5))
sns.countplot(data.condition, order = data['condition'].value_counts().index)
plt.show()
```



In [164]:

```
#корреляция
features = ['price', 'bedrooms', 'bathrooms', 'sqft_living', 'sqft_lot', 'floors', 'wat
erfront',
            'view', 'condition', 'grade', 'sqft_above', 'sqft_basement', 'yr_built',
            'yr_renovated']
plt.figure(figsize=(10, 8))

corr = data[features].corr()
sns.heatmap(corr,
            xticklabels=corr.columns.values,
            yticklabels=corr.columns.values)
plt.show()
```


price
bedrooms
bathrooms
sqft_living
sqft_lot
floors
waterfront
view
condition
grade
sqft_above
sqft_basement
yr_built
yr_renovated
1.00
0.75
0.50
0.25
0.00
−0.25

In [165]:

```
#отобранные признаки
FeaturesForRegression = data[features]
```

In [166]:

```
FeaturesForRegression.head()
```

Out[166]:

	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	condition
0	221900.0	3	1.00	1180	5650	1.0	0	0	3
1	538000.0	3	2.25	2570	7242	2.0	0	0	3
2	180000.0	2	1.00	770	10000	1.0	0	0	3
3	604000.0	4	3.00	1960	5000	1.0	0	0	5
4	510000.0	3	2.00	1680	8080	1.0	0	0	3

In [167]:

```
#модель регрессия
X=FeaturesForRegression.drop('price',axis=1)
y=FeaturesForRegression['price']
X_train, X_test, y_train, y_test = train_test_split(X, y,
                                                    test_size=0.20,
                                                    random_state=42)
lm = linear_model.LinearRegression()
model = lm.fit(X_train[['bedrooms', 'bathrooms', 'sqft_living', 'sqft_lot', 'floors',
       'waterfront', 'view', 'condition', 'grade', 'sqft_above',
       'sqft_basement', 'yr_built', 'yr_renovated']], y_train)
```

In [168]:

```
X_test
```

Out[168]:

	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	condition	grade
735	4	2.25	2070	8893	2.0	0	0	4	8
2830	5	3.00	2900	6730	1.0	0	0	5	8
4106	4	2.50	3770	10893	2.0	0	2	3	11
16218	3	3.50	4560	14608	2.0	0	2	3	12
19964	3	2.50	2550	5376	2.0	0	0	3	9
...	...	...	...	...	...	...	...	...	...
13674	3	1.75	1250	7710	1.0	0	0	4	7
20377	3	2.75	2830	3496	2.0	0	0	3	8
8805	4	2.50	2434	4400	2.0	0	0	3	8
10168	4	1.75	2250	10108	1.0	0	0	4	8
2522	4	2.50	2570	11473	2.0	0	0	3	8

4323 rows × 13 columns

In [169]:

```
y_test
```

Out[169]:

```
735       365000.0
2830      865000.0
4106     1038000.0
16218    1490000.0
19964     711000.0
            ...
13674     338000.0
20377     673000.0
8805      285000.0
10168     605000.0
2522      356500.0
Name: price, Length: 4323, dtype: float64
```

In [170]:

```
print(model.score(X_test,y_test))
```

```
0.6521777051746778
```

In [171]:

```
prediction= model.predict([[4,2.25,2070,8893,2,0,0,4,8,2070,0,1986,0]])
print('Предикт: ',prediction)
```

```
Предикт:  [516165.79233481]
```

In [172]:

```
prediction= model.predict([[5,3.00,2900,6730,1.0,0,0,5,8,1830,1070,1977,0]])
print('Предикт: ',prediction)
```

```
Предикт:  [681329.40783423]
```

In [173]:

```
prediction= model.predict([[4,2.50,3770,10893,2.0,0,2,3,11,3770,0,1997,0]])
print('Предикт: ',prediction)
```

```
Предикт:  [1219054.17289802]
```

In [ ]:

```

```

In [ ]:

```

```