

Mashinali o'qitishga kirish

**5-Ma'ruba: Chiziqli algebraga kirish. Vektorlar va
matritsalar bilan ishlash**

ass. Baltayev Rustambek

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[4] 0s import pandas as pd
df = pd.read_csv('/content/data/housing.csv')
df.head(10)

	Unnamed: 0	district	rooms	size	level	max_levels	price
0	0	Юнусабадский	3	57.0	4	4	52000.0
1	1	Яккасарайский	2	52.0	4	5	56000.0
2	2	Чиланзарский	2	42.0	4	4	37000.0
3	3	Чиланзарский	3	65.0	1	4	49500.0
4	4	Чиланзарский	3	70.0	3	5	55000.0
5	5	Чиланзарский	1	28.0	1	4	25500.0
6	6	Чиланзарский	1	30.0	2	4	21200.0
7	7	Яккасарайский	2	32.0	5	5	20000.0
8	8	Учтепинский	2	51.0	3	4	26200.0
9	9	Чиланзарский	1	30.0	1	4	22200.0

Next steps: Generate code with df View recommended plots New interactive sheet

Executing (4s) ... X

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```
✓ 0s df['district'].value_counts()
```

district	count
Чиланзарский	1616
Мирзо-Улугбекский	1342
Учтепинский	872
Юнусабадский	847
Мираабадский	717
Яккасарайский	628
Яшнободский	456
Шайхантахурский	356
Олмазорский	262
Сергелийский	159
Янгихаётский	15
Бектемирский	8

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0s

housing = df[df.district=='Чиланзарский']
housing.head(10)

{x} Unnamed: 0 district rooms size level max_levels price

Unnamed: 0	district	rooms	size	level	max_levels	price
2	2 Чиланзарский	2	42.0	4	4	37000.0
3	3 Чиланзарский	3	65.0	1	4	49500.0
4	4 Чиланзарский	3	70.0	3	5	55000.0
5	5 Чиланзарский	1	28.0	1	4	25500.0
6	6 Чиланзарский	1	30.0	2	4	21200.0
9	9 Чиланзарский	1	30.0	1	4	22200.0
11	11 Чиланзарский	3	67.0	2	5	30200.0
12	12 Чиланзарский	1	30.0	2	4	21200.0
13	13 Чиланзарский	1	30.0	2	4	21200.0
14	14 Чиланзарский	1	30.0	2	4	21200.0

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0s [31] housingArr = housing.to_numpy()
housingArr

{x} array([[2, 'Чиланзарский', 2, ..., 4, 4, 37000.0],
[3, 'Чиланзарский', 3, ..., 1, 4, 49500.0],
[4, 'Чиланзарский', 3, ..., 3, 5, 55000.0],
...,
[7433, 'Чиланзарский', 1, ..., 3, 4, 28000.0],
[7445, 'Чиланзарский', 3, ..., 1, 4, 49800.0],
[7464, 'Чиланзарский', 1, ..., 2, 4, 22914.0]], dtype=object)

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0s [31] array([[2, 'Чиланзарский', 2, ..., 4, 4, 37000.0],
[3, 'Чиланзарский', 3, ..., 1, 4, 49500.0],
[4, 'Чиланзарский', 3, ..., 3, 5, 55000.0],
...,
[7433, 'Чиланзарский', 1, ..., 3, 4, 28000.0],
[7445, 'Чиланзарский', 3, ..., 1, 4, 49800.0],
[7464, 'Чиланзарский', 1, ..., 2, 4, 22914.0]], dtype=object)

0s [33] housingArr.shape
→ (1616, 7)

0s [35] housingArr.size
→ 11312

0s [36] housingArr.ndim
→ 2

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  housing.head(5)

	Unnamed: 0	district	rooms	size	level	max_levels	price
2	2	Чиланзарский	2	42.0	4	4	37000.0
3	3	Чиланзарский	3	65.0	1	4	49500.0
4	4	Чиланзарский	3	70.0	3	5	55000.0
5	5	Чиланзарский	1	28.0	1	4	25500.0
6	6	Чиланзарский	1	30.0	2	4	21200.0

Next steps: [Generate code with housing](#) [!\[\]\(2b376d1a92330ab09dad2665d2f89bf5_img.jpg\) View recommended plots](#) [New interactive sheet](#)

[38] X = housing['size'].to_numpy()
X

```
array([42., 65., 70., ..., 32., 70., 30.])
```

 housing_price.ipynb 

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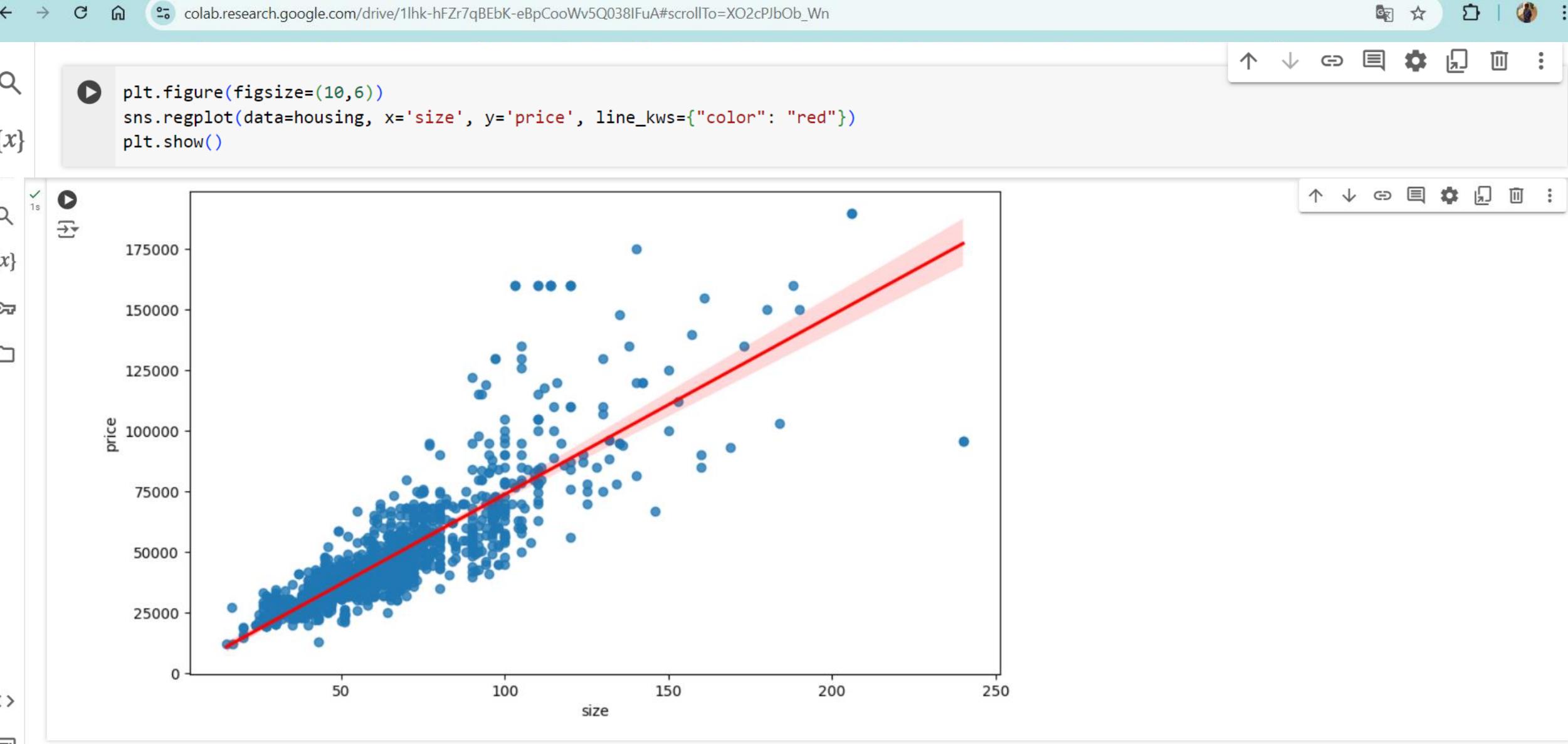
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```
✓ 0s [39] Y = housing['price'].to_numpy()  
      Y
```

```
array([37000., 49500., 55000., ..., 28000., 49800., 22914.])
```

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Yuqoridagi X va Y o'zgaruvchilardan quyidagi formuladan foydalangan xolda b va k koeffisientlarni hisoblash

$$k = \frac{\sum_{i=1}^S (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^S (x_i - \bar{x})^2}$$

$$b = \bar{y} - k\bar{x}$$

$$y = b + k*x$$

district	rooms	x size	level	max_level	y price
Чиланзарский	1	46	2	5	30000
Чиланзарский	2	49	1	4	37000
Чиланзарский	4	93	2	4	115000
Чиланзарский	3	68	3	4	48900
Чиланзарский	1	26	2	4	23500
Чиланзарский	3	73	9	9	57000
Чиланзарский	5	100	2	4	68000
Чиланзарский	2	46	4	5	37000
Чиланзарский	4	105	3	9	85000
Чиланзарский	2	56	4	4	35000

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0s [20] import numpy as np

{x} 0s [19] Xmean = np.mean(X)
Ymean = np.mean(Y)

0s [21] k = sum((X-Xmean)*(Y-Ymean))/sum((X-Xmean)**2)
print('k=', k)

→ k= 740.0264822713287

0s [23] b = Ymean - k*Xmean
print('b=', b)

→ b= -195.94911352690542

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[24] x_test = housing.sample(10, random_state=42)[‘size’].to_numpy()
print(‘x_test=’, x_test)

{x} y_test = housing.sample(10, random_state=42)[‘price’].to_numpy()
print(‘y_test=’, y_test)

→ x_test= [54. 42. 36. 60. 48. 68. 38. 65. 52. 44.]
y_test= [37500. 26500. 25500. 39000. 32500. 34500. 22700. 47000. 37900. 36000.]

[25] y_predict = b + k*x_test
print(‘y_predict=’, y_predict)

→ y_predict= [39765.48092912 30885.16314187 26445.00424824 44205.63982275
35325.3220355 50125.85168092 27925.05721278 47905.77223411
38285.42796458 32365.21610641]

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[30] `from sklearn.model_selection import train_test_split
train_set, test_set = train_test_split(housing, test_size=0.10, random_state=42)`

[34] `from sklearn import linear_model
LR_model = linear_model.LinearRegression()

x_train = np.asanyarray(train_set[['size']])
y_train = np.asanyarray(train_set[['price']])

LR_model.fit(x_train, y_train)

k = LR_model.coef_[0][0]
b = LR_model.intercept_[0]

print ('k=', k)
print ('b=', b)`

↔ k= 732.7784051414766
b= 106.31843170110369

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```
x_test = np.asarray(test_set[['size']])
y_test = np.asarray(test_set[['price']])

y_predict = LR_model.predict(x_test)
y_test
```

{x}

array([[37500.],
 [26500.],
 [25500.],
 [39000.],
 [32500.],
 [34500.],
 [22700.],
 [47000.],
 [37900.],
 [36000.],
 [24000.],
 [34000.],
 [45000.],
 [70000.],
 [35500.],
 [67997.],
 [27500.],
 [34500.],
 [38500.],
 [45000.]])

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Simple Linear Regression algoritmi yordamida bashorat modelini quring

	TV	Radio	Newspaper	Sales
0	230.1	37.8	69.2	22.1
1	44.5	39.3	45.1	10.4
2	17.2	45.9	69.3	12.0
3	151.5	41.3	58.5	16.5
4	180.8	10.8	58.4	17.9
5	8.7	48.9	75.0	7.2
6	57.5	32.8	23.5	11.8
7	120.2	19.6	11.6	13.2
8	8.6	2.1	1.0	4.8
9	199.8	2.6	21.2	15.6