РК №1 Богданов Д.А. Вариант №3

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
import category_encoders as ce

data = pd.read_csv('gender_classification_v7.csv')

data.shape

(5001, 8)

data.head

<bound method NDFrame.head of       long_hair  forehead_width_cm
forehead_height_cm  nose_wide  nose_long  \
0             1               11.8                 6.1          1
0
1             0               14.0                 5.4          0
0
2             0               11.8                 6.3          1
1
3             0               14.4                 6.1          0
1
4             1               13.5                 5.9          0
0
...         ...                ...                 ...        ...
...
4996          1               13.6                 5.1          0
0
4997          1               11.9                 5.4          0
0
4998          1               12.9                 5.7          0
0
4999          1               13.2                 6.2          0
0
5000          1               15.4                 5.4          1
1

      lips_thin  distance_nose_to_lip_long  gender
0             1                          1    Male
1             1                          0  Female
2             1                          1    Male
3             1                          1    Male
4             0                          0  Female
...         ...                        ...     ...
4996          0                          0  Female
4997          0                          0  Female
```

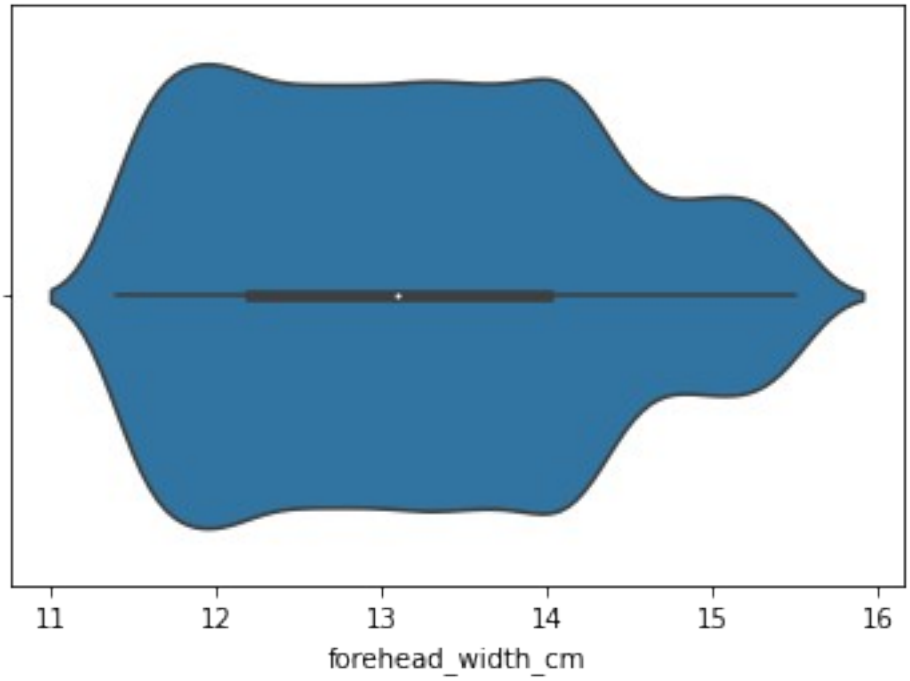
```
4998          0                          0  Female
4999          0                          0  Female
5000          1                          1    Male

[5001 rows x 8 columns]>
```

Для студентов группы ИУ5-24М, ИУ5И-24М - для произвольной колонки данных построить график "Скрипичная диаграмма (violin plot)".

```
sns.violinplot(x = data['forehead_width_cm'])
```

```
<AxesSubplot:xlabel='forehead_width_cm'>
```



Задача №1. Для набора данных проведите кодирование одного (произвольного) категориального признака с использованием метода "weight of evidence (WoE) encoding".

```
data.isnull().sum()
```

```
long_hair                   0
forehead_width_cm           0
forehead_height_cm          0
nose_wide                   0
nose_long                   0
lips_thin                   0
distance_nose_to_lip_long   0
gender                      0
dtype: int64
```

```
from category_encoders.woe import WOEEncoder as ce_WOEEncoder
```

```
ce_WOEEncoder1 = ce_WOEEncoder()
data_WOE_ENC =
ce_WOEEncoder1.fit_transform(data[data.columns.difference(['nose_wide'
])], data['nose_wide'])

data_WOE_ENC
```

```
      distance_nose_to_lip_long  forehead_height_cm  forehead_width_cm
\
0                             1                 6.1               11.8

1                             0                 5.4               14.0

2                             1                 6.3               11.8

3                             1                 6.1               14.4

4                             0                 5.9               13.5

...                         ...                 ...                ...

4996                          0                 5.1               13.6

4997                          0                 5.4               11.9

4998                          0                 5.7               12.9

4999                          0                 6.2               13.2

5000                          1                 5.4               15.4


        gender  lips_thin  long_hair  nose_long
0     1.951239          1          1          0
1    -2.015670          1          0          0
2     1.951239          1          0          1
3     1.951239          1          0          1
4    -2.015670          0          1          0
...        ...        ...        ...        ...
4996 -2.015670          0          1          0
4997 -2.015670          0          1          0
4998 -2.015670          0          1          0
4999 -2.015670          0          1          0
5000  1.951239          1          1          1

[5001 rows x 7 columns]
```

```
# Проверка поля Gender
data['gender'].unique()
```

```
array(['Male', 'Female'], dtype=object)
```

```
data_WOE_ENC['gender'].unique()
```

```
array([ 1.95123879, -2.01567037])
```

```
def check_woe_encoding(field):
    data_ones = data[data['nose_wide'] == 1].shape[0]
    data_zeros = data[data['nose_wide'] == 0].shape[0]

    for s in data[field].unique():
        data_filter = data[data[field]==s]
        if data_filter.shape[0] > 0:

            filter_data_ones = data_filter[data_filter['nose_wide'] ==
1].shape[0]
            filter_data_zeros = data_filter[data_filter['nose_wide']
== 0].shape[0]

            good = filter_data_ones / data_ones
            bad = filter_data_zeros / data_zeros

            woe = np.log(good/bad)
            print(s, '-' , woe)
```

```
check_woe_encoding('gender')
```

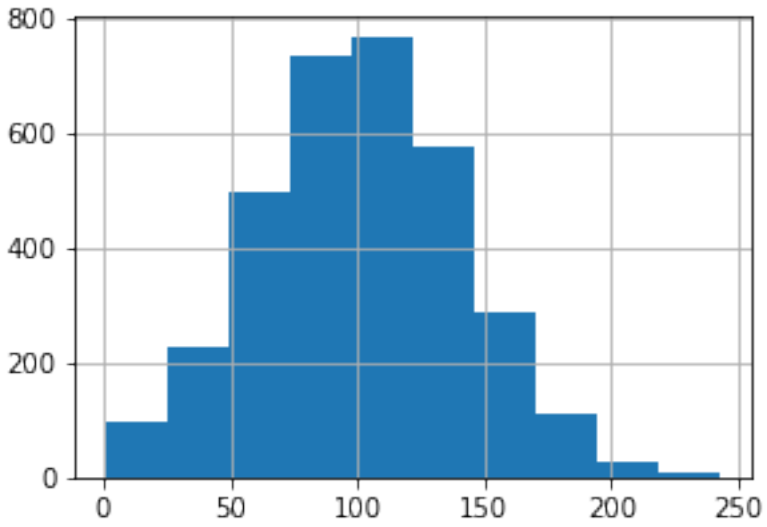
```
Male - 1.9539499135957643
Female - -2.01867756658586
```

Задача №23. Для набора данных для одного (произвольного) числового признака проведите обнаружение и удаление выбросов на основе правила трех сигм.

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

```
fig, ax = plt.subplots(figsize=(10,7))
plt.subplot(2, 2, 1)
data['account length'].hist(bins=10)
```

```
<AxesSubplot:>
```

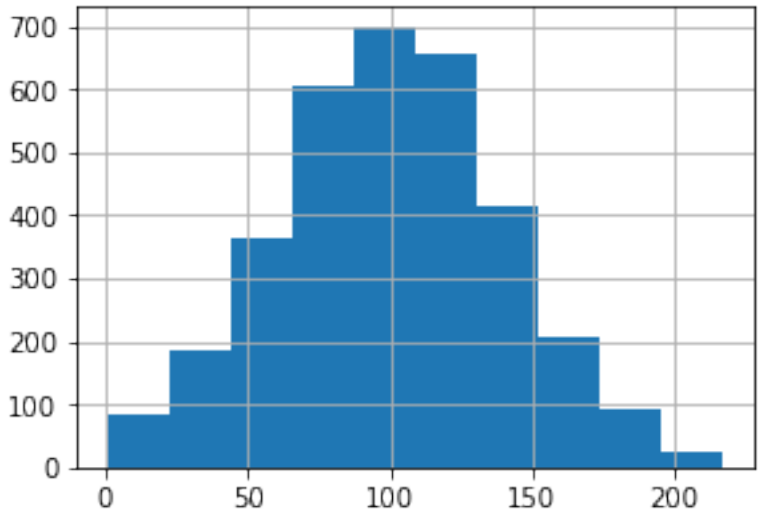



```
def get_outlier_boundaries(df, col):
    K1 = 3
    lower_boundary = df[col].mean() - (K1 * df[col].std())
    upper_boundary = df[col].mean() + (K1 * df[col].std())
    return lower_boundary, upper_boundary

lower_boundary, upper_boundary = get_outlier_boundaries(data, 'account
length')
outliers_temp = np.where(data['account length'] > upper_boundary,
True,
                                    np.where(data['account length'] <
lower_boundary, True, False))
data_trimmed = data.loc[~(outliers_temp), ]

fig, ax = plt.subplots(figsize=(10,7))
plt.subplot(2, 2, 1)
data_trimmed['account length'].hist(bins=10)

<AxesSubplot:>
```


700
600
500
400
300
200
100
0
0
50
100
150
200