МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ ИМЕНИ Н.Э. БАУМАНА

Факультет Информатика и системы управления

Кафедра Системы обработки информации и управления (ИУ5)

Технологии машинного обучения

Отчет по лабораторной работе №1

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ЛР №1

Импорт библиотек

In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from pandas.plotting import scatter_matrix
import warnings
warnings.filterwarnings('ignore')
sns.set(style="ticks")
%matplotlib inline
```

Загрузка данных

In [2]:
```
data = pd.read_csv('StudentsPerformance.csv', sep = ',' )
```

2)Основные характеристики датасета

In [3]:
```
# Первые пять строк датасета
data.head()
```

Out[3]:

	gender	race/ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score
0	female	group B	bachelor's degree	standard	none	72	72	74
1	female	group C	some college	standard	completed	69	90	88
2	female	group B	master's degree	standard	none	90	95	93
3	male	group A	associate's degree	free/reduced	none	47	57	44
4	male	group C	some college	standard	none	76	78	75

In [4]:
```
# Размер датасета
data.shape
```

Out[4]:
```
(1000, 8)
```

In [5]:
```
# Количество нулевых элементов
data.isnull().sum()
```

Out[5]:
```
gender                       0
race/ethnicity               0
parental level of education  0
lunch                        0
test preparation course      0
math score                   0
reading score                0
writing score                0
dtype: int64
```

In [6]:
```
 # Колонки и их типы данных
data.dtypes
```

Out[6]:
```
gender                         object
race/ethnicity                 object
parental level of education    object
lunch                          object
test preparation course        object
math score                      int64
reading score                   int64
writing score                   int64
dtype: object
```

In [7]:
```
# Описание датасета
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 8 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   gender                       1000 non-null   object
 1   race/ethnicity               1000 non-null   object
 2   parental level of education  1000 non-null   object
 3   lunch                        1000 non-null   object
 4   test preparation course      1000 non-null   object
 5   math score                   1000 non-null   int64
 6   reading score                1000 non-null   int64
 7   writing score                1000 non-null   int64
dtypes: int64(3), object(5)
memory usage: 62.6+ KB
```

In [8]:
```
# Статистические данные
data.describe()
```

Out[8]:

	math score	reading score	writing score
count	1000.00000	1000.000000	1000.000000
mean	66.08900	69.169000	68.054000
std	15.16308	14.600192	15.195657
min	0.00000	17.000000	10.000000
25%	57.00000	59.000000	57.750000
50%	66.00000	70.000000	69.000000
75%	77.00000	79.000000	79.000000
max	100.00000	100.000000	100.000000

In [10]:
```
# Удаляем столбец lunch
data = data.drop('lunch', axis = 1)
```

In [11]:
```
# Первые пять строк датасета
data.head()
```

Out[11]:

	gender	race/ethnicity	parental level of education	test preparation course	math score	reading score	writing score
0	female	group B	bachelor's degree	none	72	72	74
1	female	group C	some college	completed	69	90	88
2	female	group B	master's degree	none	90	95	93
3	male	group A	associate's degree	none	47	57	44
4	male	group C	some college	none	76	78	75

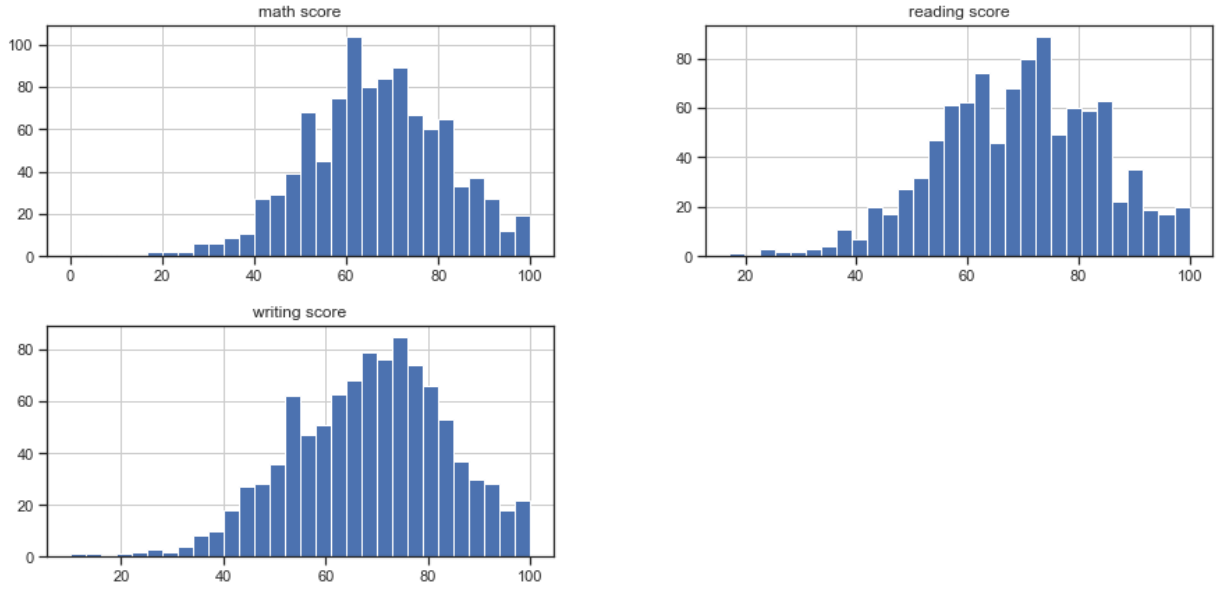
In [12]:
```
# Определим уникальные значения для целевого признака
data['race/ethnicity'].unique()
```

Out[12]:
```
array(['group B', 'group C', 'group A', 'group D', 'group E'],
      dtype=object)
```

3) Визуальное исследование датасета

In [13]:
```
# Гистограммы для всех признаков
data.hist(bins=30, figsize = (15,7))
```

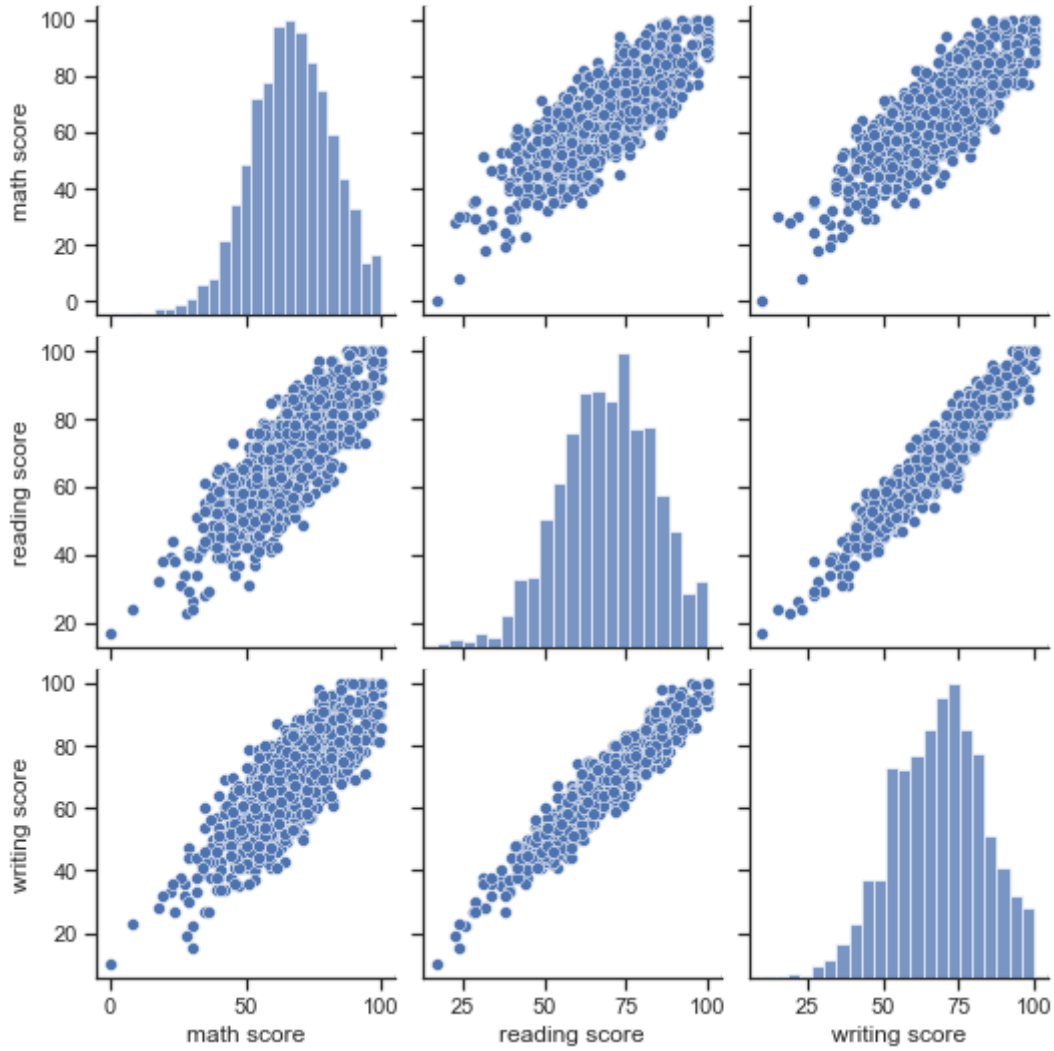
Out[13]:
```
array([[<AxesSubplot:title={'center':'math score'}>,
        <AxesSubplot:title={'center':'reading score'}>],
       [<AxesSubplot:title={'center':'writing score'}>, <AxesSubplot:>]],
      dtype=object)
```



In [14]:
```
# Диаграммы рассеяние для всех признаков
plt.figure(figsize=(12,6))
sns.pairplot(data)
```

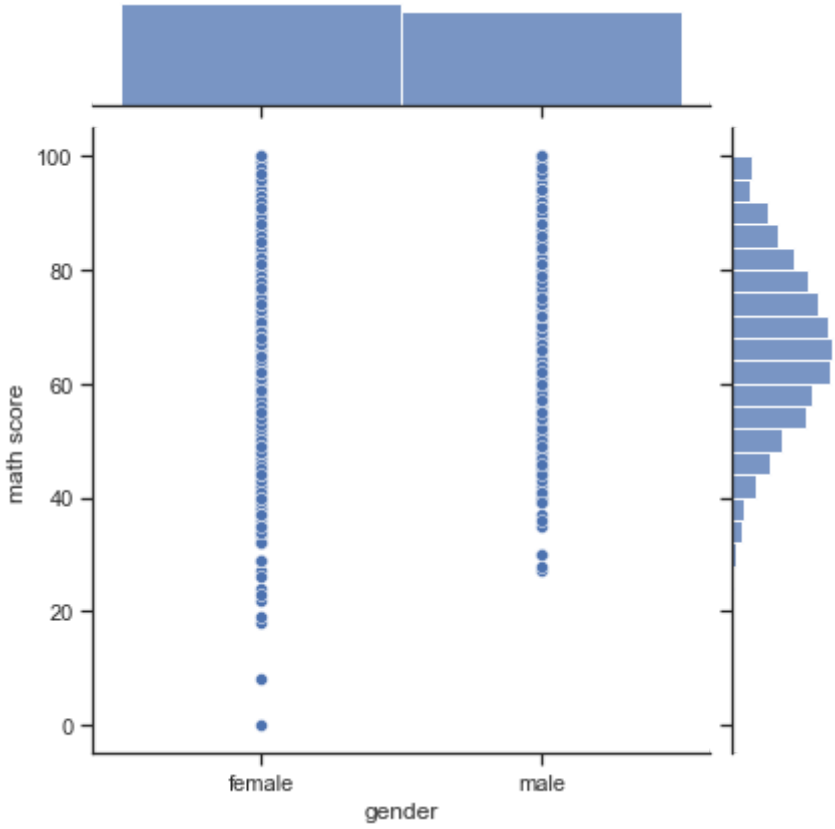
Out[14]:
```
<seaborn.axisgrid.PairGrid at 0x2c3e0c49700>
```

```
<Figure size 864x432 with 0 Axes>
```



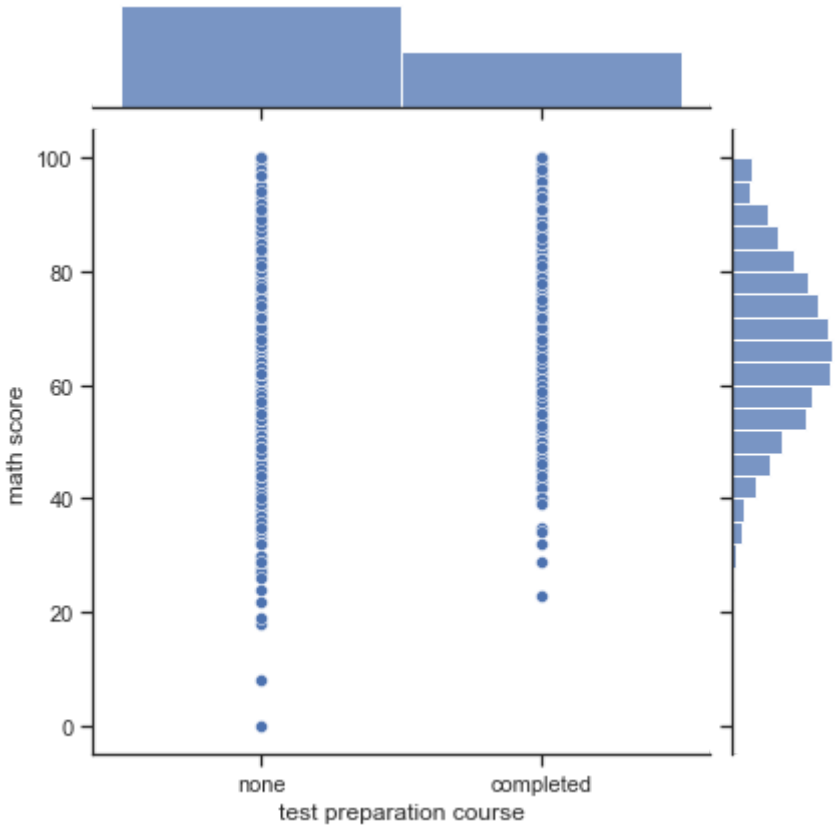
In [15]:
```
# Увеличенные диаграммы рассеяния для признаков, которые имеют зависимость
sns.jointplot(x = "gender", y = "math score", kind="scatter", data = data)
```

Out[15]:
```
<seaborn.axisgrid.JointGrid at 0x2c3e151bbe0>
```



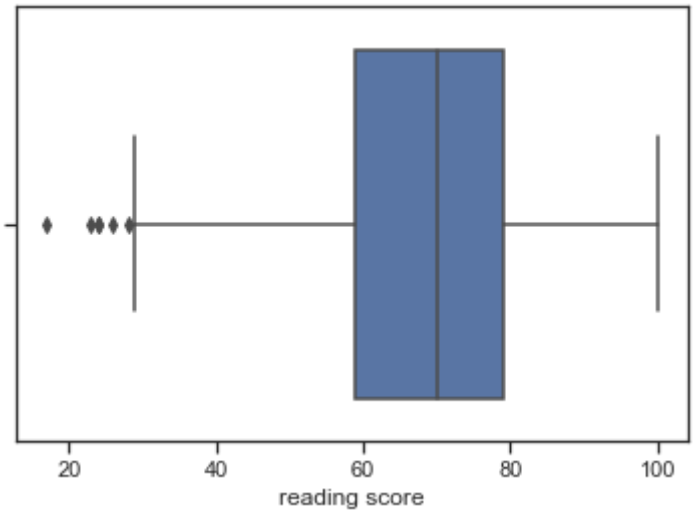
In [16]:
```
sns.jointplot(x = "test preparation course", y = "math score", kind="scatter", data
```

Out[16]:
```
<seaborn.axisgrid.JointGrid at 0x2c3e0dd1580>
```



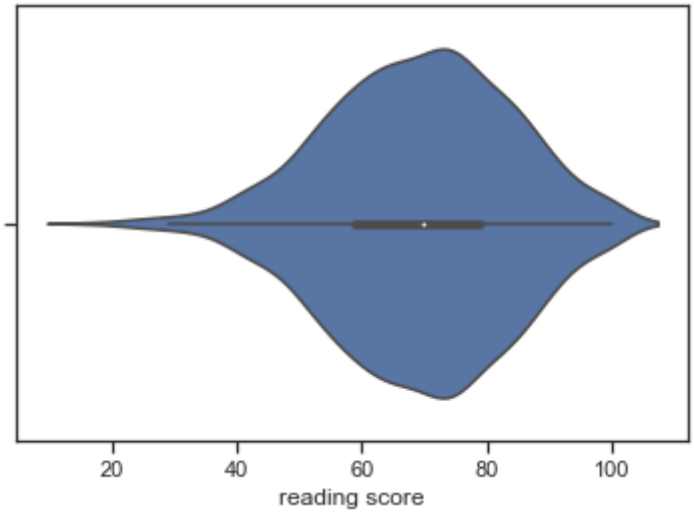
In [17]:
```
# Одномерное распределение вероятности
sns.boxplot(x=data['reading score'])
```

Out[17]:
```
<AxesSubplot:xlabel='reading score'>
```



In [18]:
```
sns.violinplot(x=data['reading score'])
```

Out[18]:
```
<AxesSubplot:xlabel='reading score'>
```



4) Корреляции признаков

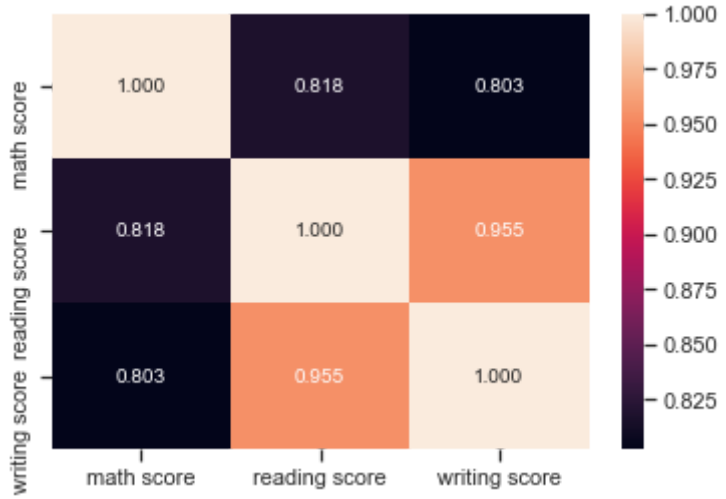
In [19]:
```
corr_matrix = data.corr()
```

In [20]:
```
corr_matrix['writing score']
```

Out[20]:
```
math score       0.802642
reading score    0.954598
writing score    1.000000
Name: writing score, dtype: float64
```

In [21]:
```
sns.heatmap(data.corr(), annot=True, fmt='.3f')
```

Out[21]:
```
<AxesSubplot:>
```


1.000
0.818
0.803
0.818
1.000
0.955
0.803
0.955
1.000
math score
reading score
writing score
math score
reading score
writing score
1.000
0.975
0.950
0.925
0.900
0.875
0.850
0.825

In [ ]:

In [ ]: