In [21]:

```
import pandas as pd
from matplotlib import pyplot as plt
```

In [13]:

```
df = pd.read_csv('../../data/beauty.csv', sep=';')
```

In [14]:

```
df.head()
```

Out[14]:

	wage	exper	union	goodhlth	black	female	married	service	educ	looks
0	5.73	30	0	1	0	1	1	1	14	4
1	4.28	28	0	1	0	1	1	0	12	3
2	7.96	35	0	1	0	1	0	0	10	4
3	11.57	38	0	1	0	0	1	1	16	3
4	11.42	27	0	1	0	0	1	0	16	3

In [20]:

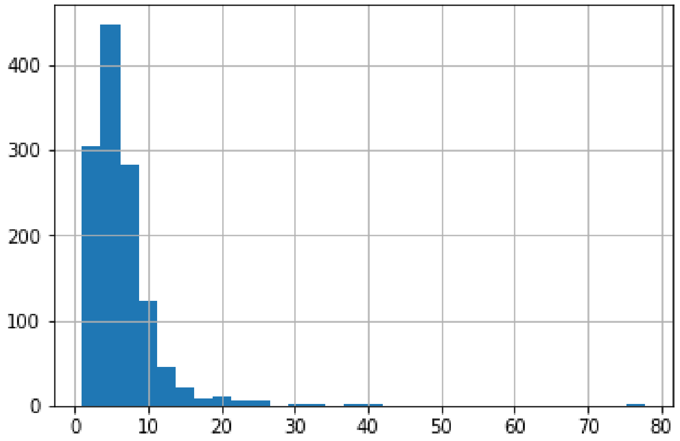
```
df['wage'].describe()
```

Out[20]:

```
count    1260.000000
mean        6.306690
std         4.660639
min         1.020000
25%         3.707500
50%         5.300000
75%         7.695000
max        77.720000
Name: wage, dtype: float64
```

In [23]:

```
df['wage'].hist(bins=30);
```



In [25]:

```
stats_df = df.describe()
```

In [27]:

```
stats_df['union']
```

Out[27]:

```
count    1260.000000
mean        0.272222
std         0.445280
min         0.000000
25%         0.000000
50%         0.000000
75%         1.000000
max         1.000000
Name: union, dtype: float64
```

In [28]:

```
df.head()
```

Out[28]:

	wage	exper	union	goodhlth	black	female	married	service	educ	looks
0	5.73	30	0	1	0	1	1	1	14	4
1	4.28	28	0	1	0	1	1	0	12	3
2	7.96	35	0	1	0	1	0	0	10	4
3	11.57	38	0	1	0	0	1	1	16	3
4	11.42	27	0	1	0	0	1	0	16	3

Indexing data

iloc

In [30]:

```
df.iloc[:10, 5]
```

Out[30]:

```
0    1
1    1
2    1
3    0
4    0
5    1
6    0
7    0
8    1
9    1
Name: female, dtype: int64
```

loc

In [32]:

```
df.loc[:10, ['wage', 'exper', 'educ']]
```

Out[32]:

	wage	exper	educ
0	5.73	30	14
1	4.28	28	12
2	7.96	35	10
3	11.57	38	16
4	11.42	27	16
5	3.91	20	12

	wage	exper	educ
5	3.91	20	12
6	8.76	12	16
7	7.69	5	16
8	5.00	5	16
9	3.89	12	12
10	3.45	3	12

In [36]:

```
toy_df = pd.DataFrame({'age': [40, 45, 32],
                        'salary': [78, 45, 67]},
                       index=['Kate', 'Leo', 'Max'])
```

In [37]:

```
toy_df
```

Out[37]:

	age	salary
Kate	40	78
Leo	45	45
Max	32	67

In [38]:

```
toy_df.loc[['Kate', 'Leo'], 'age']
```

Out[38]:

```
Kate     40
Leo      45
Name: age, dtype: int64
```

In [45]:

```
df[(df['wage'] > 40)
   & (df['female'] == 0)]
```

Out[45]:

	wage	exper	union	goodhlth	black	female	married	service	educ	looks
269	41.67	16	0	0	0	0	1	0	13	4

In [ ]:

```

```

In [ ]:

```

```

In [47]:

```
df.loc[df['female'] == 0, 'married'].mean()
```

Out[47]:

```
0.7985436893203883
```

In [48]:

```
df.loc[df['female'] == 1, 'married'].mean()
```

Out[48]:

```
0.48853211009174313
```

```
0.40068211009174318
```

In [49]:

```
df.shape
```

Out[49]:

```
(1260, 10)
```

In [50]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1260 entries, 0 to 1259
Data columns (total 10 columns):
wage        1260 non-null float64
exper       1260 non-null int64
union       1260 non-null int64
goodhlth    1260 non-null int64
black       1260 non-null int64
female      1260 non-null int64
married     1260 non-null int64
service     1260 non-null int64
educ        1260 non-null int64
looks       1260 non-null int64
dtypes: float64(1), int64(9)
memory usage: 98.5 KB
```

In [51]:

```
df['wage'].mean(), df['wage'].median()
```

Out[51]:

```
(6.306690476190469, 5.3)
```

In [53]:

```
df['looks'].unique()
```

Out[53]:

```
array([4, 3, 2, 5, 1])
```

In [54]:

```
df['looks'].value_counts()
```

Out[54]:

```
3    722
4    364
2    142
5     19
1     13
Name: looks, dtype: int64
```

In [56]:

```
df['female'].value_counts(normalize=True)
```

Out[56]:

```
0    0.653968
1    0.346032
Name: female, dtype: float64
```

GroupBy

In [60]:

```
for (gender, sub_dataframe) in df.groupby('female'):
    print("Female: %d " % gender)

    print('Median wage')
    print(sub_dataframe['wage'].median())
```

```
Female: 0
Median wage
6.41
Female: 1
Median wage
3.75
```

In [62]:

```
df.groupby(['married', 'female'])['wage', 'looks'].median()
```

Out[62]:

		wage	looks
married	**female**		
0	**0**	5.065	3
	1	3.890	3
1	**0**	6.710	3
	1	3.580	3

In [63]:

```
pd.crosstab(df['married'], df['female'])
```

Out[63]:

female	**0**	**1**
married		
0	166	223
1	658	213

apply

In [65]:

```
def gender_as_string(gender_id):

    '''
    if gender_id == 1:
        return 'female'
    else:
        return 'male'
    '''

    return 'female' if gender_id else 'male'
```

In [67]:

```
df['female'].apply(gender_as_string).head()
```

Out[67]:

```
0    female
1    female
2    female
3      male
4      male
Name: female, dtype: object
```

In [68]:

```
df['female'].apply(lambda gender_id:
                   'female' if gender_id else 'male').head()
```

Out[68]:

```
0    female
1    female
2    female
3      male
4      male
Name: female, dtype: object
```

In [70]:

```
df['female'].map({1 : 'female', 0: 'male' }).head()
```

Out[70]:

```
0    female
1    female
2    female
3      male
4      male
Name: female, dtype: object
```

In [71]:

```
DOLLAR_TO_EURO = 0.84
```

In [73]:

```
df['wage'].apply(lambda w: w / DOLLAR_TO_EURO).head()
```

Out[73]:

```
0     6.821429
1     5.095238
2     9.476190
3    13.773810
4    13.595238
Name: wage, dtype: float64
```

In [75]:

```
(df['wage'] / DOLLAR_TO_EURO).head()
```

Out[75]:

```
0     6.821429
1     5.095238
2     9.476190
3    13.773810
4    13.595238
Name: wage, dtype: float64
```

In [ ]:

```

```

In [79]:

```
df['educ'].value_counts()
```

Out[79]:

```
12    468
13    246
10    156
17    132
16    121
14     51
8      44
5      42
Name: educ, dtype: int64
```

In [77]:

```
df['educ'].nunique()
```

Out[77]:

```
8
```

In [80]:

```
import numpy as np
```

In [81]:

```
df.groupby('educ')['wage'].agg([np.mean, np.median])
```

Out[81]:

educ	mean	median
5	4.587857	4.26
8	4.969091	3.97
10	5.524295	4.45
12	5.698205	4.81
13	6.642642	5.29
14	5.613529	5.39
16	7.792645	7.21
17	8.661061	6.90

In [83]:

```
# pip install seaborn
import seaborn as sns
sns.set()
```

IQR = qrt_75 - qrt_25

In [88]:

```
df['wage'].median(), df['wage'].mean()
```

Out[88]:

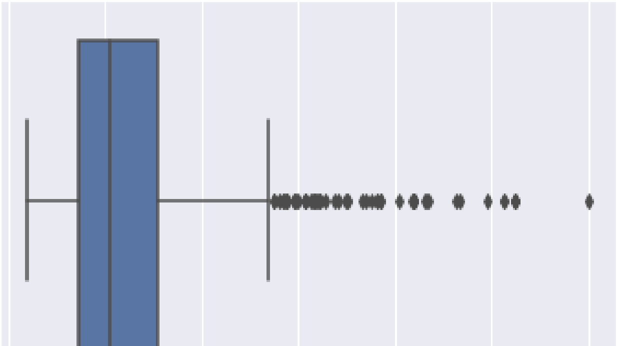
```
(5.3, 6.306690476190469)
```

In [86]:

```
sns.boxplot(x='wage', data=df[df['wage'] < 30])
```

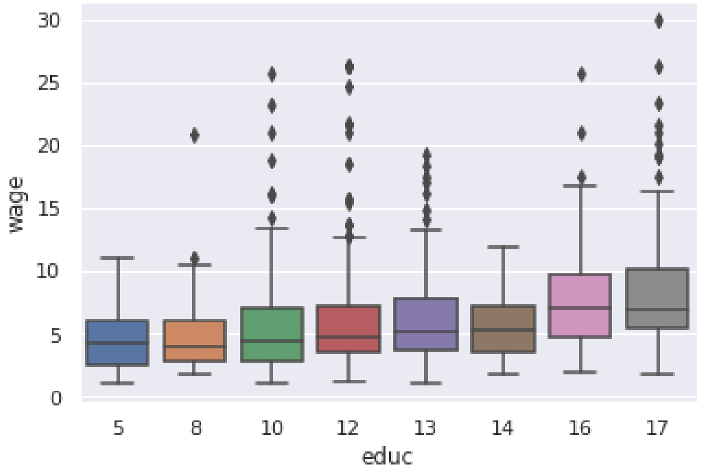
Out[86]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f9ecea78470>
```



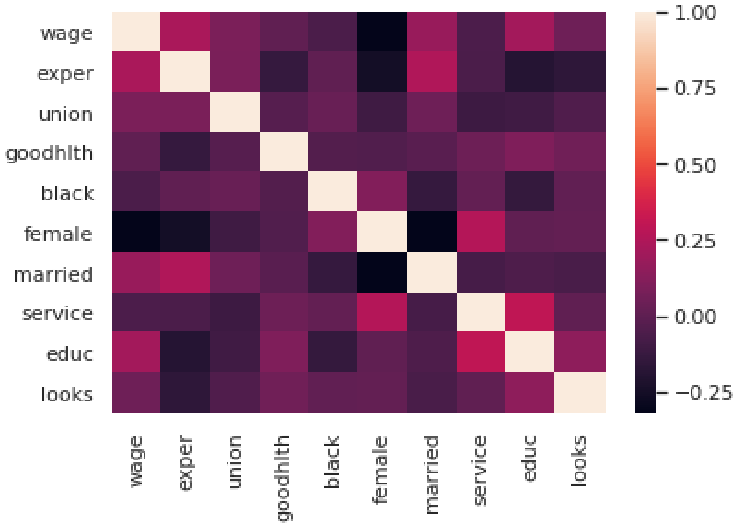
In [90]:

```
sns.boxplot(x='educ', y='wage', data=df[df['wage'] < 30]);
```



In [93]:

```
sns.heatmap(df.corr());
```



In [98]:

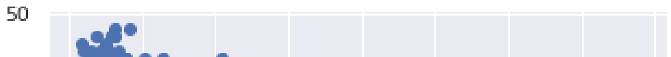
```
df.corrwith(df['wage'])
```

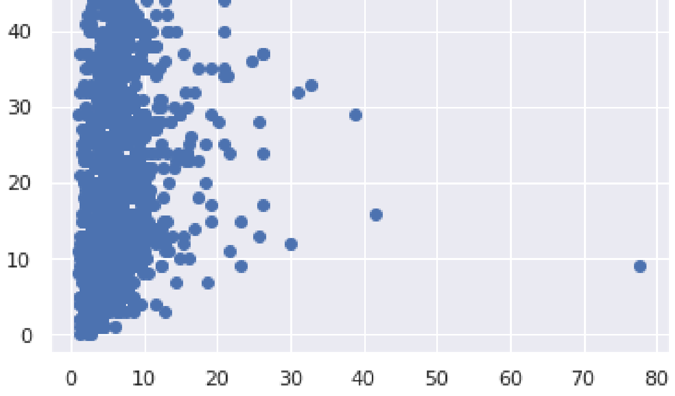
Out[98]:

```
wage        1.000000
exper       0.234632
union       0.094529
goodhlth    0.006756
black      -0.059052
female     -0.313419
married     0.184521
service    -0.053653
educ        0.212333
looks       0.055019
dtype: float64
```

In [101]:

```
plt.scatter(df['wage'], df['exper']);
```





In [103]:

```
df[df['looks'].isin([1, 3, 5])]
```

Out[103]:

	wage	exper	union	goodhlth	black	female	married	service	educ	looks
1	4.28	28	0	1	0	1	1	0	12	3
3	11.57	38	0	1	0	0	1	1	16	3
4	11.42	27	0	1	0	0	1	0	16	3
5	3.91	20	0	0	0	1	1	0	12	3
6	8.76	12	0	1	0	0	1	0	16	3
8	5.00	5	0	1	0	1	0	0	16	3
9	3.89	12	0	1	0	1	0	0	12	3
13	3.00	8	0	1	0	0	0	1	16	3
16	5.16	7	0	1	0	0	1	0	17	3
19	7.69	7	0	1	0	1	1	1	16	3
21	6.79	19	0	1	0	0	1	1	14	3
22	6.87	33	0	1	0	0	1	1	12	3
23	17.03	32	0	1	0	0	1	0	13	3
26	14.84	29	0	1	0	0	0	1	13	5
27	19.08	17	0	1	0	0	0	0	17	5
28	8.35	41	0	0	0	0	1	1	16	1
29	9.62	40	0	0	0	0	1	0	16	3
30	5.96	10	0	1	0	0	1	0	14	3
31	5.73	43	0	0	0	0	1	0	10	3
38	12.50	31	0	1	0	0	1	0	16	3
39	2.82	18	0	1	0	0	1	1	12	3
40	12.31	9	1	1	0	0	0	0	17	3
41	13.22	42	0	1	0	0	1	0	16	3
43	11.54	27	0	1	0	0	1	0	16	3
44	4.95	20	0	1	1	1	0	1	14	3
45	7.21	14	0	1	0	0	1	0	17	3
46	11.58	4	0	1	0	0	1	0	17	3
47	15.38	13	0	1	0	0	1	0	17	3
48	6.10	5	0	1	0	0	1	1	17	3
49	7.93	32	0	1	0	0	1	1	17	3
...	...	...	...	...	...	...	...	...	...	...
1212	1.75	18	0	1	0	1	0	1	12	3

	wage	exper	union	goodhlth	black	female	married	service	educ	looks
1213	[illegible]	6	0	1	0	1	1	1	12	3
1214	1.02	11	0	1	0	1	1	1	13	3
1216	2.83	28	0	1	1	1	0	1	13	3
1217	3.29	2	0	1	0	1	1	1	10	3
1218	1.98	45	0	1	0	1	0	1	12	3
1219	23.16	9	0	1	0	0	0	1	10	3
1221	3.00	40	0	1	0	0	0	1	13	3
1224	2.63	12	0	1	0	1	1	1	10	3
1228	6.25	3	0	1	0	1	0	1	12	3
1232	6.93	36	1	1	0	0	1	0	12	3
1233	1.56	4	0	1	0	0	0	0	12	3
1234	1.98	8	0	1	0	1	0	1	10	3
1235	8.75	24	1	1	0	0	0	1	16	3
1237	4.71	16	0	1	0	0	1	0	13	3
1238	4.87	10	0	1	0	0	1	0	13	3
1242	4.21	13	1	1	0	0	1	0	12	3
1244	12.82	15	1	1	0	0	1	0	13	3
1245	6.73	34	0	1	0	0	1	0	10	3
1246	5.39	8	1	1	0	0	1	0	14	3
1249	8.65	10	1	1	0	0	1	0	13	3
1250	4.17	13	0	1	0	0	1	0	10	3
1251	6.81	7	1	1	0	0	0	0	12	3
1252	9.62	21	1	1	0	0	1	0	16	3
1253	1.22	10	0	1	0	1	0	1	5	3
1254	1.79	20	0	1	0	1	1	1	8	3
1255	1.61	25	0	1	1	1	0	1	12	3
1257	3.29	35	0	1	1	1	0	1	12	3
1258	2.31	15	0	1	1	1	1	1	10	3
1259	1.92	24	0	0	0	1	0	1	16	3

754 rows × 10 columns

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
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In [ ]:
```