In [41]:
```python
import warnings

warnings.filterwarnings('ignore')
```

In [42]:
```python
import numpy as np
import pandas as pd
from sklearn.metrics import accuracy_score

data = pd.read_csv("titanic/train.csv", index_col="PassengerId")

data.head()
```

Out[42]:

	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
PassengerId											
1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

In [43]:
```python
target = "Survived"

y = data[target]
X = data.drop(target, axis=1)
X.drop(["Cabin", "Name", "Ticket"], axis=1, inplace=True)

age_mean = X["Age"].mean()
# print(age_mean)
X["Age"].fillna(age_mean, inplace=True)

X["Embarked"].fillna("S", inplace=True)
sex_map = {
    "female": 1,
    "male": 0,
}

X["Sex"] = X["Sex"].map(sex_map)

X["Pclass"] = X["Pclass"].astype("category")

X = pd.get_dummies(X)

X.head()
```

Out[43]:

	Sex	Age	SibSp	Parch	Fare	Pclass_1	Pclass_2	Pclass_3	Embarked_C	Embarked_Q	Embarked_S
PassengerId											
1	0	22.0	1	0	7.2500	0	0	1	0	0	1
2	1	38.0	1	0	71.2833	1	0	0	1	0	0
3	1	26.0	0	0	7.9250	0	0	1	0	0	1
4	1	35.0	1	0	53.1000	1	0	0	0	0	1
5	0	35.0	0	0	8.0500	0	0	1	0	0	1

In [44]:
```
from sklearn.model_selection import train_test_split

X_train, X_valid, y_train, y_valid = train_test_split(X, y, test_size=0.25, random_state=42)
```

In [45]:
```
from sklearn.preprocessing import MinMaxScaler

scaler = MinMaxScaler()

X_train = pd.DataFrame(scaler.fit_transform(X_train), columns=X_train.columns)

X_valid = pd.DataFrame(scaler.transform(X_valid), columns=X_valid.columns)
```

In [46]:
```
from sklearn.svm import SVC
clf = SVC(gamma="auto")

clf.fit(X_train, y_train)
```

Out[46]:
```
SVC(C=1.0, break_ties=False, cache_size=200, class_weight=None, coef0=0.0,
    decision_function_shape='ovr', degree=3, gamma='auto', kernel='rbf',
    max_iter=-1, probability=False, random_state=None, shrinking=True,
    tol=0.001, verbose=False)
```

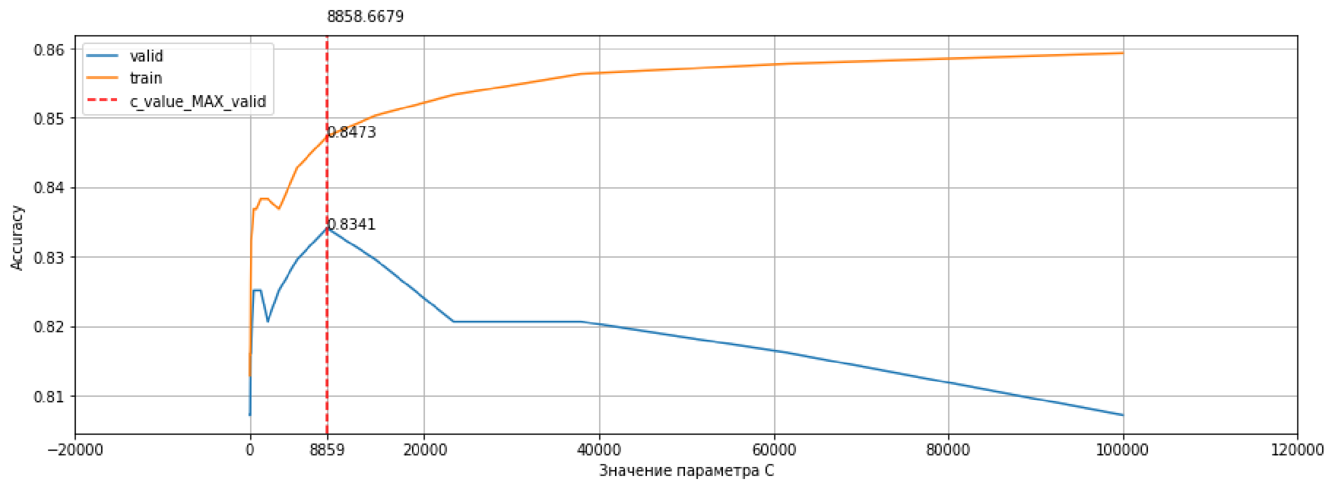
In [47]:
```
y_pred = clf.predict(X_valid)
y_pred_train = clf.predict(X_train)
```

In [164]:
```
c_values = np.logspace(1, 5, 20)

accuracy_on_valid = []
accuracy_on_train = []

accuracy_on_valid_Max=0
accuracy_on_train_Max=0
c_value_max=0

for i, value in enumerate(c_values):
    clf = SVC(C=value, gamma="auto")

    clf.fit(X_train, y_train)

    y_pred = clf.predict(X_valid)
    y_pred_train = clf.predict(X_train)

    acc_valid = accuracy_score(y_valid, y_pred)
    acc_train = accuracy_score(y_train, y_pred_train)

    if acc_valid > accuracy_on_valid_Max:
        accuracy_on_train_Max = acc_train
        accuracy_on_valid_Max = acc_valid
        c_value_max= value

    if i % 5 == 0:
        print('C = {}'.format(value))
        print('\tacc_valid = {}'.format(acc_valid))
        print('\tacc_train = {}\n'.format(acc_train))

    accuracy_on_valid.append(acc_valid)
    accuracy_on_train.append(acc_train)

print (f"c_value_max: {c_value_max}, accuracy_on_valid_Max: {accuracy_on_valid_Max}, accuracy_on
_train_Max: {accuracy_on_train_Max}" )
```

```
C = 10.0
        acc_valid = 0.8071748878923767
        acc_train = 0.812874251497006

C = 112.88378916846884
        acc_valid = 0.8161434977578476
        acc_train = 0.8263473053892215

C = 1274.2749857031336
        acc_valid = 0.8251121076233184
        acc_train = 0.8383233532934131

C = 14384.498882876629
        acc_valid = 0.8295964125560538
        acc_train = 0.8502994011976048

c_value_max: 8858.667904100823, accuracy_on_valid_Max: 0.8340807174887892, accuracy_on_train_Ma
x: 0.8473053892215568
```

In [163]:
```python
from matplotlib import pyplot as plt
#from pylab import rcParams

#plt.rcParams['figure.figsize'] = 10,10
plt.figure(figsize=(18,6))

%matplotlib inline

fig,ax=plt.subplots(nrows=1,ncols=1)
fig.set_size_inches(15,5)

ax.plot(c_values, accuracy_on_valid, label="valid")
ax.plot(c_values, accuracy_on_train, label="train")

ax.set_xlabel('Значение параметра C')
ax.set_ylabel('Accuracy')

# ax.plot([c_value_max]*10, np.linspace(0.8, 0.875, 10), '--', c = 'r')
ax.axvline(c_value_max, 0, 1, label='c_value_MAX_valid', c='red', linestyle="--")

ax.text(c_value_max, ax.get_ylim()[1]+0.002, round(c_value_max, 4) )
ax.text(c_value_max, accuracy_on_valid_Max, round(accuracy_on_valid_Max, 4) )
ax.text(c_value_max, accuracy_on_train_Max, round(accuracy_on_train_Max, 4) )


print(ax.get_xticks())
ax.set_xticks(np.append(ax.get_xticks(),c_value_max))
print(ax.get_xticks())

from matplotlib import ticker

# ax.yaxis.set_minor_locator(ticker.MultipleLocator(10))
ax.legend()
ax.grid()

plt.show()
```

```
[-20000.      0.  20000.  40000.  60000.  80000. 100000. 120000.]
[-20000.              0.          20000.          40000.
  60000.          80000.         100000.         120000.
   8858.6679041]
```



In [157]:
```python
ax.get_ylim()
```

Out[157]:
```
(0.804569560430708, 0.8618867645874171)
```