In [1]:
```
import pandas as pd
from sklearn.datasets import load_digits
digits = load_digits()
```

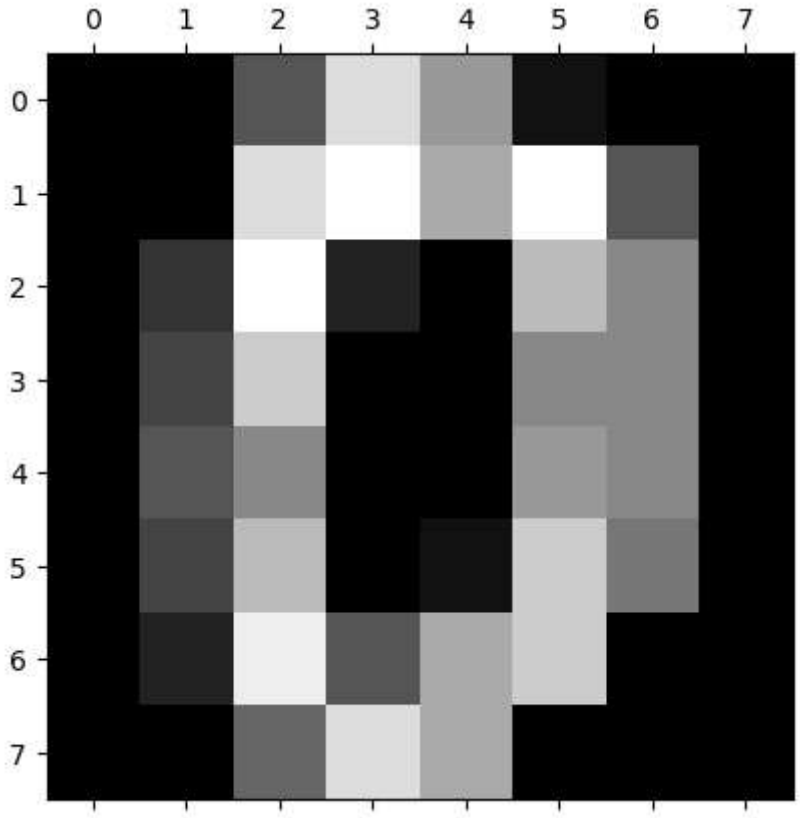
In [2]:
```
dir(digits)
```

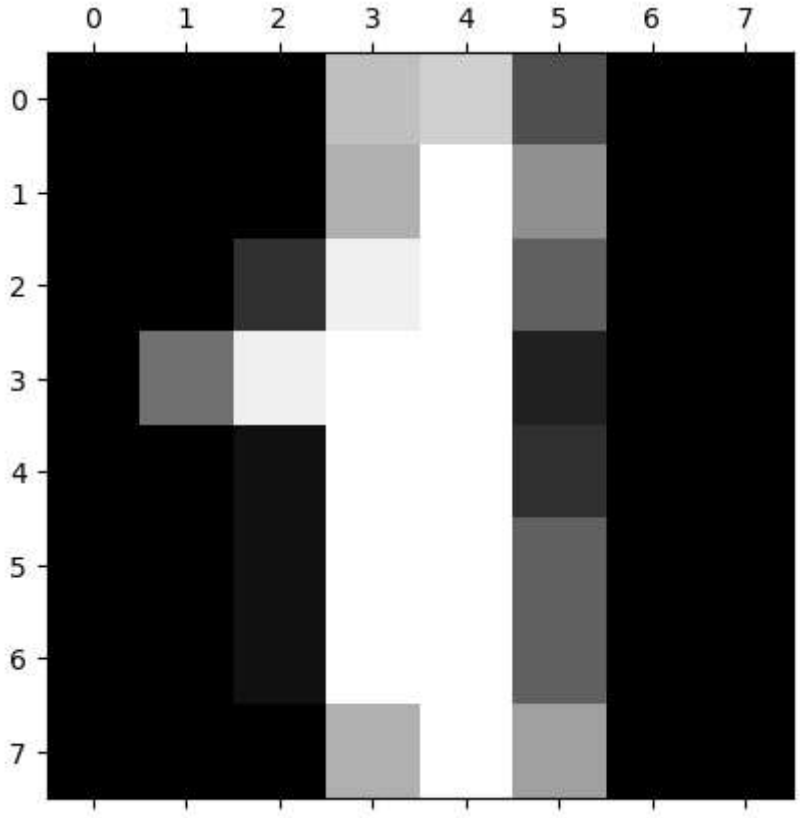
Out[2]:
```
['DESCR', 'data', 'feature_names', 'frame', 'images', 'target', 'target_name
s']
```

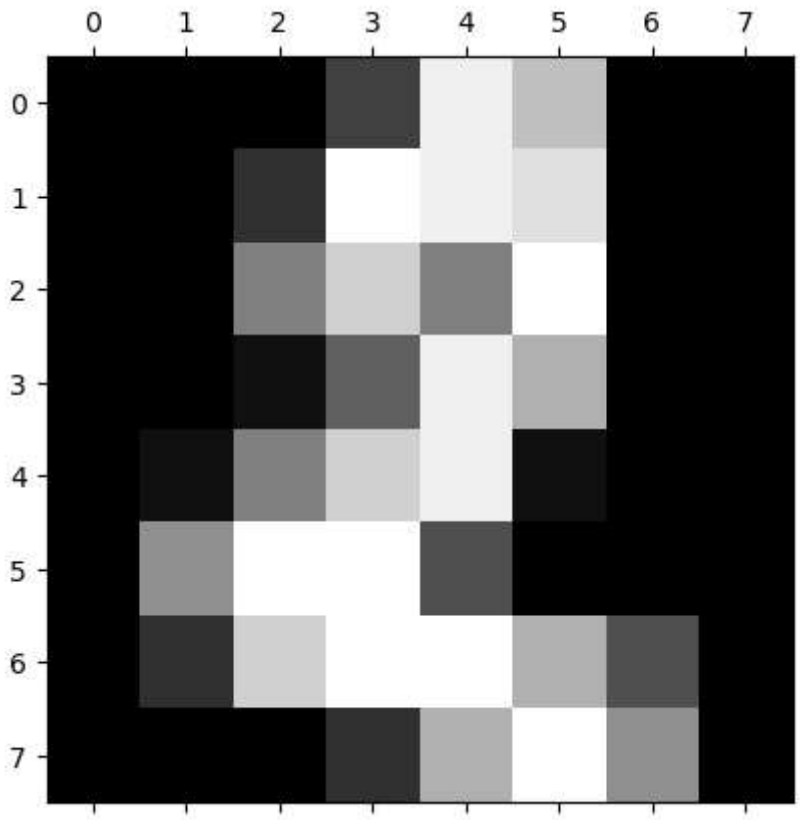
In [3]:
```
import matplotlib.pyplot as plt
```

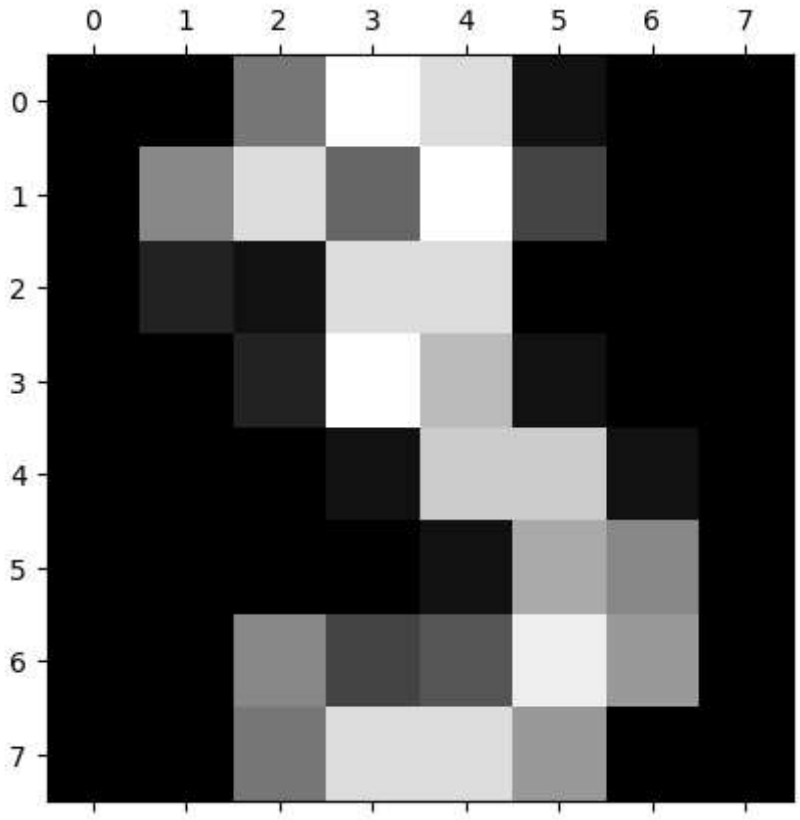
In [20]:
```
plt.gray()
for i in range(4):
    plt.matshow(digits.images[i])
```

```
<Figure size 640x480 with 0 Axes>
```






0 1 2 3 4 5 6 7
0
1
2
3
4
5
6
7


0 1 2 3 4 5 6 7
0
1
2
3
4
5
6
7

In [21]:
```
df = pd.DataFrame(digits.data)
df.head()
```

Out[21]:

	0	1	2	3	4	5	6	7	8	9	...	54	55	56	57	58	59	60	61
0	0.0	0.0	5.0	13.0	9.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	6.0	13.0	10.0	0.0
1	0.0	0.0	0.0	12.0	13.0	5.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	11.0	16.0	10.0
2	0.0	0.0	0.0	4.0	15.0	12.0	0.0	0.0	0.0	0.0	...	5.0	0.0	0.0	0.0	0.0	3.0	11.0	16.0
3	0.0	0.0	7.0	15.0	13.0	1.0	0.0	0.0	0.0	8.0	...	9.0	0.0	0.0	0.0	7.0	13.0	13.0	9.0
4	0.0	0.0	0.0	1.0	11.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	2.0	16.0	4.0

5 rows × 64 columns

In [22]:
```
df['target'] = digits.target
```

In [23]:
```
df[0:12]
```

Out[23]:

	0	1	2	3	4	5	6	7	8	9	...	55	56	57	58	59	60	61
0	0.0	0.0	5.0	13.0	9.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	6.0	13.0	10.0	0.0
1	0.0	0.0	0.0	12.0	13.0	5.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	11.0	16.0	10.0
2	0.0	0.0	0.0	4.0	15.0	12.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	3.0	11.0	16.0
3	0.0	0.0	7.0	15.0	13.0	1.0	0.0	0.0	0.0	8.0	...	0.0	0.0	0.0	7.0	13.0	13.0	9.0
4	0.0	0.0	0.0	1.0	11.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	2.0	16.0	4.0
5	0.0	0.0	12.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	9.0	16.0	16.0	10.0
6	0.0	0.0	0.0	12.0	13.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	1.0	9.0	15.0	11.0
7	0.0	0.0	7.0	8.0	13.0	16.0	15.0	1.0	0.0	0.0	...	0.0	0.0	0.0	13.0	5.0	0.0	0.0
8	0.0	0.0	9.0	14.0	8.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	11.0	16.0	15.0	11.0
9	0.0	0.0	11.0	12.0	0.0	0.0	0.0	0.0	0.0	2.0	...	0.0	0.0	0.0	9.0	12.0	13.0	3.0
10	0.0	0.0	1.0	9.0	15.0	11.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	1.0	10.0	13.0	3.0
11	0.0	0.0	0.0	0.0	14.0	13.0	1.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	1.0	13.0	16.0

12 rows × 65 columns

In [24]:
```
X = df.drop('target',axis='columns')
y = df.target
```

In [25]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.2)
```

In [26]:
```
from sklearn.ensemble import RandomForestClassifier
model = RandomForestClassifier(n_estimators=20)
model.fit(X_train, y_train)
```

Out[26]:
```
RandomForestClassifier(n_estimators=20)
```
In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [27]:
```
model.score(X_test, y_test)
```

Out[27]:
```
0.9666666666666667
```

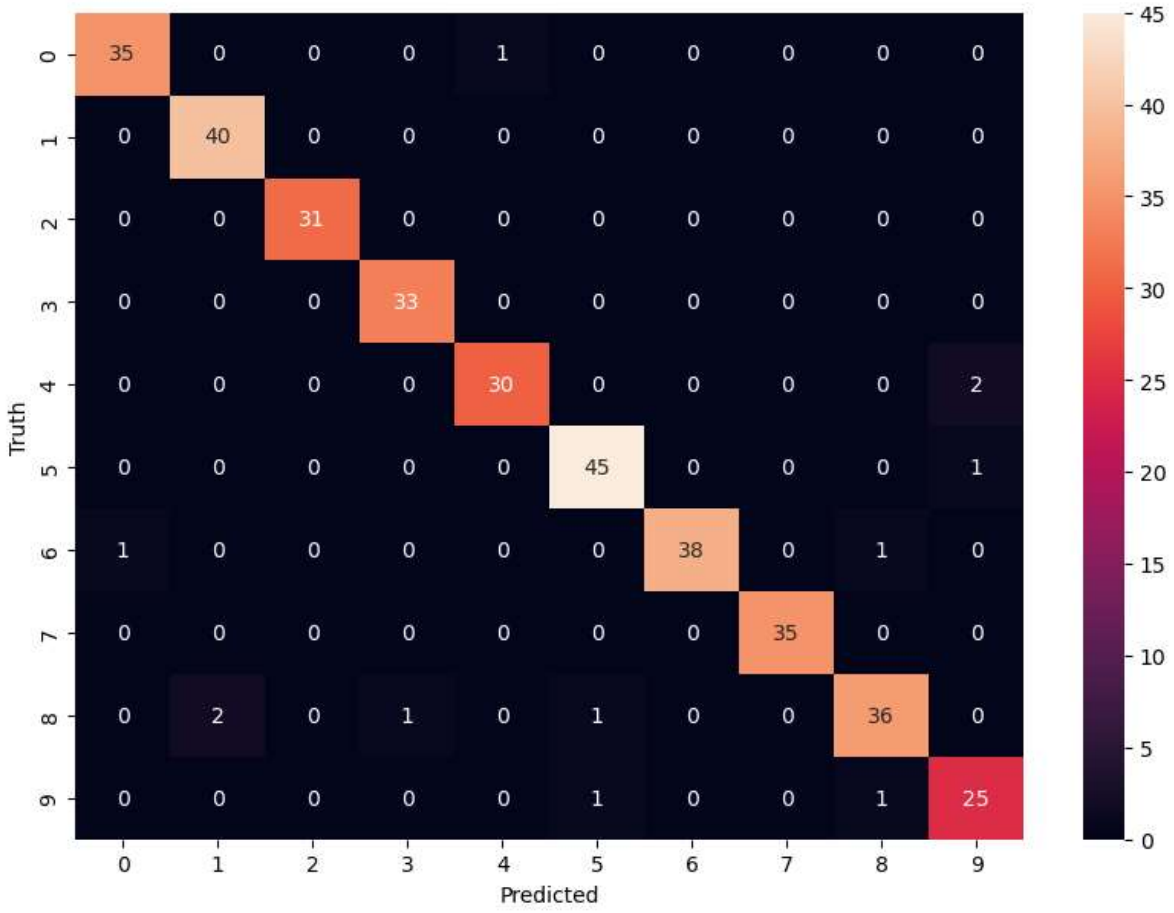
In [28]:
```
y_predicted = model.predict(X_test)
```

In [29]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_predicted)
cm
```

Out[29]:
```
array([[35,  0,  0,  0,  1,  0,  0,  0,  0,  0],
       [ 0, 40,  0,  0,  0,  0,  0,  0,  0,  0],
       [ 0,  0, 31,  0,  0,  0,  0,  0,  0,  0],
       [ 0,  0,  0, 33,  0,  0,  0,  0,  0,  0],
       [ 0,  0,  0,  0, 30,  0,  0,  0,  0,  2],
       [ 0,  0,  0,  0,  0, 45,  0,  0,  0,  1],
       [ 1,  0,  0,  0,  0,  0, 38,  0,  1,  0],
       [ 0,  0,  0,  0,  0,  0,  0, 35,  0,  0],
       [ 0,  2,  0,  1,  0,  1,  0,  0, 36,  0],
       [ 0,  0,  0,  0,  0,  1,  0,  0,  1, 25]], dtype=int64)
```

In [30]:
```
%matplotlib inline
import matplotlib.pyplot as plt
import seaborn as sn
plt.figure(figsize=(10,7))
sn.heatmap(cm,annot=True)
plt.xlabel('Predicted')
plt.ylabel('Truth')
```

Out[30]: Text(95.72222222222221, 0.5, 'Truth')



In [ ]:
```
```