In [46]:

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import matplotlib.image as mpimg
```

In [53]:

```
df = pd.read_csv('mnist_train.csv')
print(df.shape)
```

```
(42000, 785)
```

In [54]:

```
df.head(n=5)
```

	label	pixel0	pixel1	pixel2	pixel3	pixel4	pixel5	pixel6	pixel7	pixel8	...	pixel774	pixel775
0	1	0	0	0	0	0	0	0	0	0	...	0	0
1	0	0	0	0	0	0	0	0	0	0	...	0	0
2	1	0	0	0	0	0	0	0	0	0	...	0	0
3	4	0	0	0	0	0	0	0	0	0	...	0	0
4	0	0	0	0	0	0	0	0	0	0	...	0	0

5 rows × 785 columns

In [35]:

```
data = df.values
print(data.shape)
print(type(data))
```

```
(42000, 785)
<class 'numpy.ndarray'>
```

In [37]:

```
X = data[:,1:]
Y = data[:,0]

print(X.shape,Y.shape)
```

```
(42000, 784) (42000,)
```

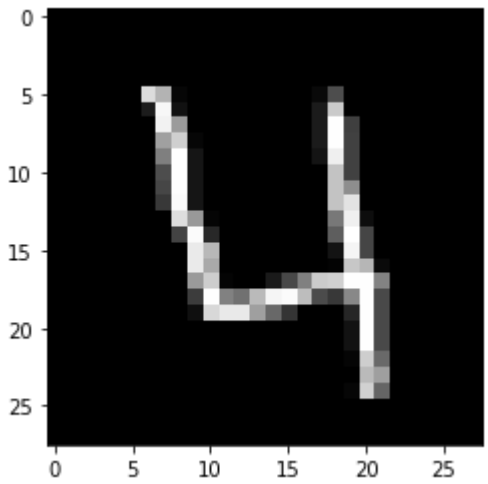
In [38]:

```
split = int(.8*X.shape[0])
print("Split:",split)

X_train = X[:split,:]
Y_train = Y[:split]

X_test = X[split:,:]
Y_test = Y[split:]

print(X_train.shape,Y_train.shape)
print(X_test.shape,Y_test.shape)
```

```
Split: 33600
(33600, 784) (33600,)
(8400, 784) (8400,)
```

In [39]:

```
# Visualize Img
def drawImg(sample):
    img = sample.reshape((28,28))
    plt.imshow(img,cmap='gray')
    plt.show()


drawImg(X_train[3])
```



In [ ]:

In [40]:

```
def dist(x1,x2):
    return np.sqrt(sum((x1-x2)**2))

def KNN(X,Y,query_point,K=5):
    vals = []
    m = X.shape[0]

    for i in range(m):
        d = dist(query_point,X[i])
        vals.append((d,Y[i]))

    vals = sorted(vals)
    # Nearest/First K points
    vals = vals[:K]

    vals = np.array(vals)
    print("Vals: ",vals)
    new_vals = np.unique(vals[:,1],return_counts=True)
    print(new_vals)

    index = new_vals[1].argmax()
    pred = new_vals[0][index]

    return pred
```

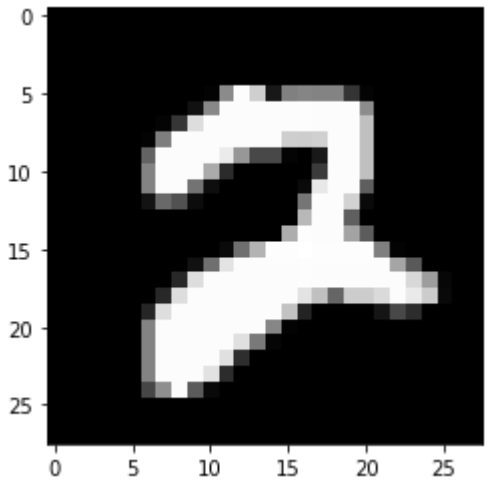
In [45]:

```
pred = KNN(X_train,Y_train,X_test[3])
print(int(pred))
```

```
 Vals:  [[1506.99933643    2.        ]
 [1571.6459525     2.        ]
 [1577.24538357    2.        ]
 [1593.9661226     2.        ]
 [1623.17312693    2.        ]]
(array([2.]), array([5], dtype=int64))
2
```

In [43]:

```
drawImg(X_test[3])
print(Y_test[3])
```




```
2
```

In [ ]: