ASSIGNMENT-6

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RISHABH SHARMA
20MAI0082

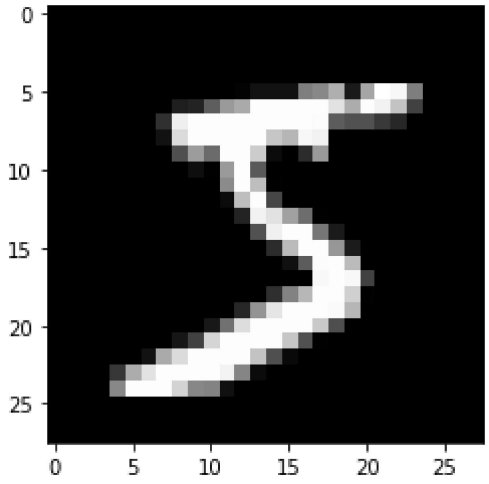
Github link :- Deep-Learning-Assignments/Assignment-6 at main · rishabh5197/Deep-Learning-Assignments · GitHub

In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import tensorflow as tf
from keras.models import Model
from keras.layers import Input,Dense,Flatten,Reshape
from keras.datasets import mnist
from keras.optimizers import Adam
import cv2
```

In [2]:
```
(x_train, y_train),(x_test, y_test) = tf.keras.datasets.mnist.load_data()
x_train = x_train/255.0
x_test = x_test/255.0
```

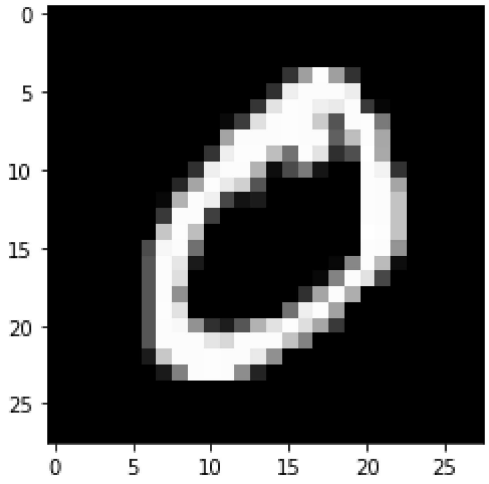
In [3]:
```
plt.imshow(x_train[0], cmap="gray")
```

Out[3]: <matplotlib.image.AxesImage at 0x7feb1a6eb950>



In [4]:
```
plt.imshow(x_train[1], cmap="gray")
```

Out[4]: <matplotlib.image.AxesImage at 0x7feb1a1d1c50>



In [5]:
```
1 x_train[0].shape
```

Out[5]: (28, 28)

In [6]:
```
1 encoder_input = Input(shape=(28, 28, 1), name='img')
2 x = Flatten()(encoder_input)
3 encoder_output = Dense(64, activation="relu")(x)
4 encoder = Model(encoder_input, encoder_output, name='encoder')
5 decoder_input = Dense(64, activation="relu")(encoder_output)
6 x = Dense(784, activation="relu")(decoder_input)
7 decoder_output = Reshape((28, 28, 1))(x)
8 opt = Adam(lr=0.001, decay=1e-6)
```

In [7]:
```
1 autoencoder = Model(encoder_input, decoder_output, name='autoencoder')
```

In [8]:
```
1 autoencoder.summary()
```

```
Model: "autoencoder"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
img (InputLayer)             [(None, 28, 28, 1)]       0
_________________________________________________________________
flatten (Flatten)            (None, 784)               0
_________________________________________________________________
dense (Dense)                (None, 64)                50240
_________________________________________________________________
dense_1 (Dense)              (None, 64)                4160
_________________________________________________________________
dense_2 (Dense)              (None, 784)               50960
_________________________________________________________________
reshape (Reshape)            (None, 28, 28, 1)         0
=================================================================
Total params: 105,360
Trainable params: 105,360
Non-trainable params: 0
_________________________________________________________________
```

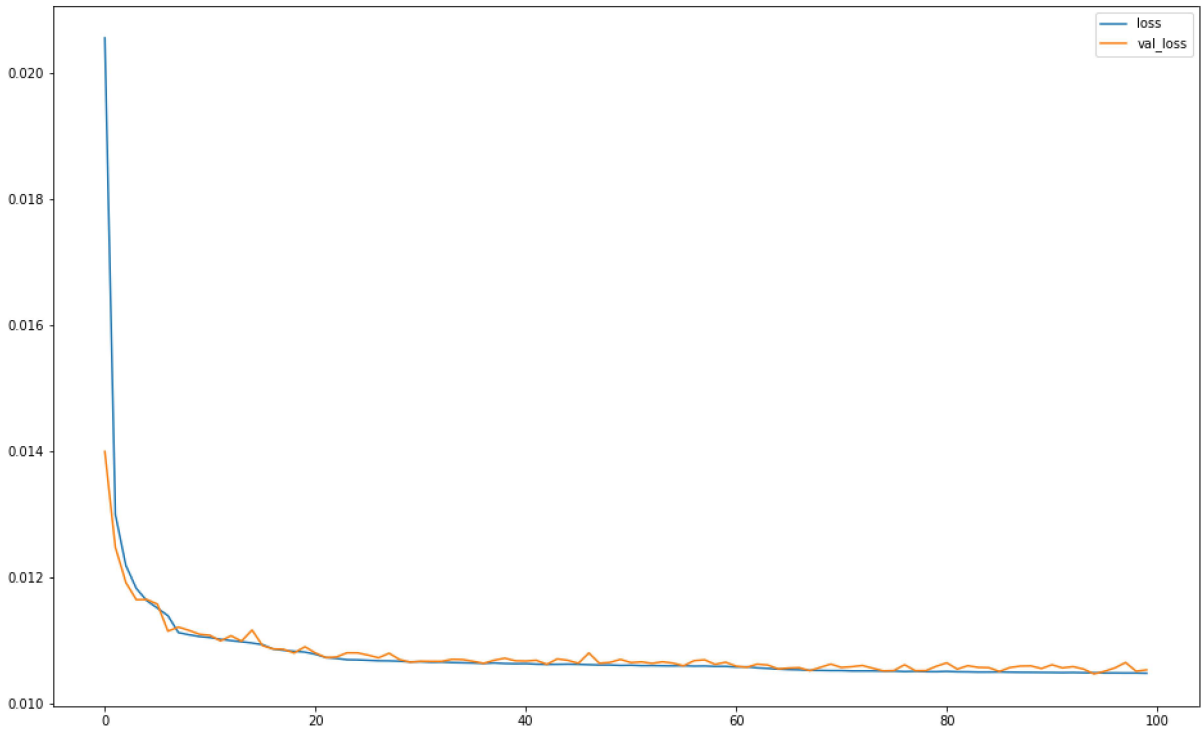
In [9]:
```
1 autoencoder.compile(opt, loss='mse')
```

In [10]:
```
history = autoencoder.fit(x_train,x_train,epochs=100, batch_size=32, validation_split=
```

```
Epoch 1/100
1688/1688 [==============================] - 5s 2ms/step - loss: 0.0314 - val_loss: 0.0
140
Epoch 2/100
1688/1688 [==============================] - 3s 2ms/step - loss: 0.0133 - val_loss: 0.0
125
Epoch 3/100
1688/1688 [==============================] - 3s 2ms/step - loss: 0.0123 - val_loss: 0.0
119
Epoch 4/100
1688/1688 [==============================] - 3s 2ms/step - loss: 0.0119 - val_loss: 0.01
17
Epoch 5/100
1688/1688 [==============================] - 3s 2ms/step - loss: 0.0116 - val_loss: 0.01
17
Epoch 6/100
1688/1688 [==============================] - 4s 2ms/step - loss: 0.0115 - val_loss: 0.01
16
Epoch 7/100
```

In [11]:
```
history=pd.DataFrame(history.history)
history.plot(figsize=(16,10))
```

Out[11]: <matplotlib.axes._subplots.AxesSubplot at 0x7feb100fdb50>



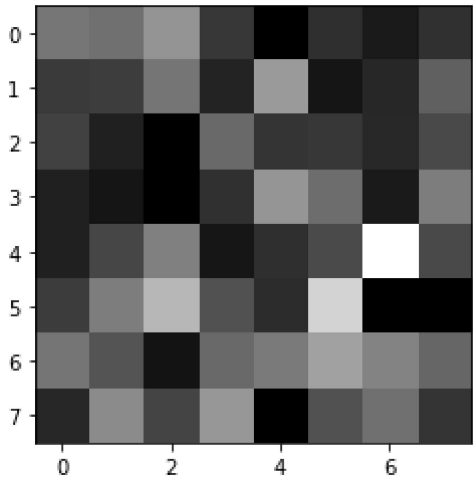
In [12]:
```
example = encoder.predict([ x_test[0].reshape(-1, 28, 28, 1) ])
```

In [13]:
```
print(example[0].shape)
print(example[0])
```

```
(64,)
[1.6225708  1.5220733  2.024408   0.7571401  0.         0.653636
 0.35433292 0.68050766 0.7987205  0.8507085  1.5922581  0.5082049
 2.1137788  0.2910179  0.5471906  1.3018699  0.91408944 0.46017277
 0.         1.451652   0.7307642  0.7659637  0.571785   1.0072689
 0.45836622 0.28206348 0.         0.67702526 2.0430918  1.494662
 0.36278114 1.7095569  0.45008233 0.9501813  1.7558467  0.3072954
 0.63628936 1.03131    3.5042682  1.0212511  0.83454555 1.7245982
 2.523524   1.111186   0.6239486  2.910634   0.         0.
 1.6003249  1.1625733  0.2658943  1.4486437  1.6723976  2.2105305
 1.8127978  1.4091725  0.5249502  1.9184961  0.94215    2.069564
 0.         1.1146244  1.5428814  0.7133487 ]
```

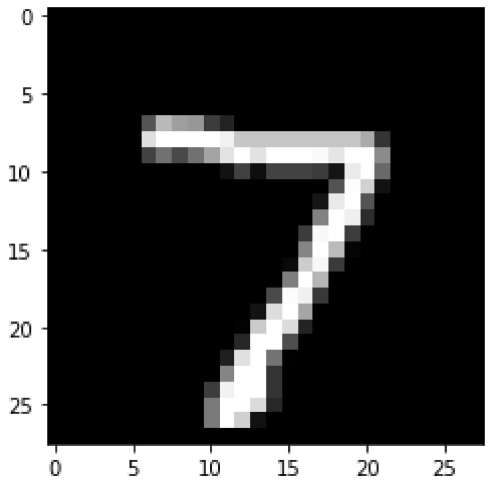
In [14]:
```
plt.imshow(example[0].reshape((8,8)), cmap="gray")
```

Out[14]: <matplotlib.image.AxesImage at 0x7feace2b7390>



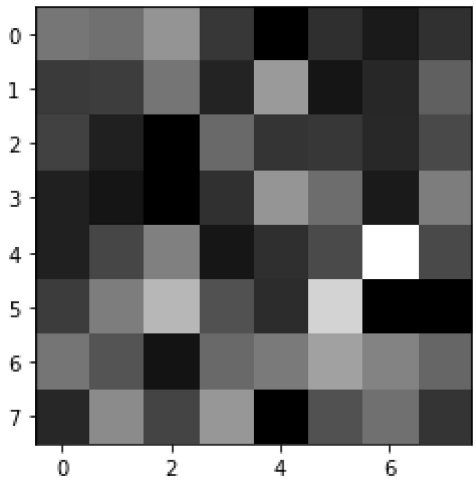
In [15]:
```
plt.imshow(x_test[0], cmap="gray")
```

Out[15]: <matplotlib.image.AxesImage at 0x7feace2f4050>



In [16]:
```
1 plt.imshow(example[0].reshape((8,8)), cmap="gray")
```

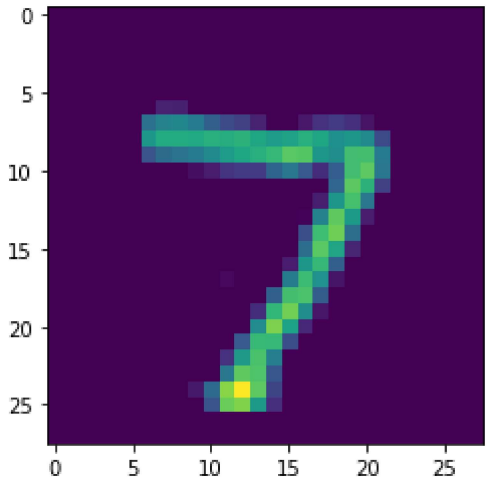
Out[16]: <matplotlib.image.AxesImage at 0x7feace2009d0>



In [17]:
```
1 ae_out = autoencoder.predict([ x_test[0].reshape(-1, 28, 28, 1) ])
2 img = ae_out[0]
```

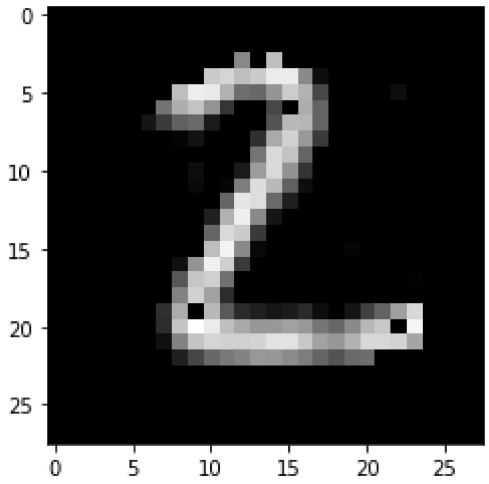
In [18]:
```
1 plt.imshow(img.reshape(28,28))
```

Out[18]: <matplotlib.image.AxesImage at 0x7feb25194f50>



In [19]:
```
ae_out = autoencoder.predict([ x_test[1].reshape(-1, 28, 28, 1) ])
img = ae_out[0]
plt.imshow(ae_out[0].reshape(28,28), cmap="gray")
```

Out[19]: <matplotlib.image.AxesImage at 0x7feace14cf50>



In [20]:
```
ae_out = autoencoder.predict([ x_test[2].reshape(-1, 28, 28, 1) ])
img = ae_out[0]
plt.imshow(ae_out[0].reshape(28,28), cmap="gray")
```

Out[20]: <matplotlib.image.AxesImage at 0x7feace0b9d90>