```
function q1(numbers)

    imgTrainAll = loadMNISTImages('./train-images.idx3-ubyte');
    lblTrainAll = loadMNISTLabels('./train-labels.idx1-ubyte');

    for i = numbers
        %img = imgTrainAll(:, n);
        lblImg = lblTrainAll(i);
        %fprintf('\n Label: %d', lblImg);
        disp(lblImg);
    end

end

function q2(nNumber)

    imgTestAll = loadMNISTImages('./t10k-images.idx3-ubyte');
    lblTestAll = loadMNISTLabels('./t10k-labels.idx1-ubyte');

     figure;
     img = imgTestAll(:, nNumber);
     img2D = reshape(img, 28, 28);
     strLabelImage = num2str(lblTestAll(nNumber));
     strLabelImage = [strLabelImage, '(', num2str(nNumber), ')'];
     imshow(img2D);
     title(strLabelImage);

end

function q3()

imgTrainAll = loadMNISTImages('./train-images.idx3-ubyte');
lblTrainAll = loadMNISTLabels('./train-labels.idx1-ubyte');

result = zeros(10, 1);
numLabels = size(lblTrainAll, 1);
for i = 0:9
    for j = 1:numLabels
        lblNumber = lblTrainAll(j);
        if(i == lblNumber)
            result(i+1, 1) = result(i+1, 1) + 1;
        end
    end
```

```
end
result

End

function q4()

imgTrainAll = loadMNISTImages('./t10k-images.idx3-ubyte');
lblTrainAll = loadMNISTLabels('./t10k-labels.idx1-ubyte');

result = zeros(10, 1);
numLabels = size(lblTrainAll, 1);
for i = 0:9
   for j = 1:numLabels
      lblNumber = lblTrainAll(j);
      if(i == lblNumber)
         result(i+1, 1) = result(i+1, 1) + 1;
      end
   end
end
result

end


function q5(nNumber)
   imgTrainAll = loadMNISTImages('./train-images.idx3-ubyte');
   lblTrainAll = loadMNISTLabels('./train-labels.idx1-ubyte');

   imgTestAll = loadMNISTImages('./t10k-images.idx3-ubyte');
   lblTestAll = loadMNISTLabels('./t10k-labels.idx1-ubyte');

   Mdl = fitcknn(imgTrainAll', lblTrainAll);

   imgTest = imgTestAll(:, nNumber);
   lblPredictTest = predict(Mdl, imgTest');


    figure;
    img2D = reshape(imgTest, 28, 28);
    imshow(img2D);
    strLblPredictTest = num2str(lblPredictTest);
    title(strLblPredictTest);
```

```
End

function q6(nNumber)
   imgTrainAll = loadMNISTImages('./train-images.idx3-ubyte');
   lblTrainAll = loadMNISTLabels('./train-labels.idx1-ubyte');

   imgTestAll = loadMNISTImages('./t10k-images.idx3-ubyte');
   lblTestAll = loadMNISTLabels('./t10k-labels.idx1-ubyte');

   Mdl = fitcknn(imgTrainAll', lblTrainAll);

   imgTest = imgTestAll(:, nNumber);
   lblPredictTest = predict(Mdl, imgTest');
   lblImageTest = lblTestAll(nNumber);

    figure;
    img2D = reshape(imgTest, 28, 28);
    imshow(img2D);

    strLabelImage = ['Ban dau ', num2str(lblTestAll(nNumber)), '.'];
    strLabelImage = [strLabelImage, ' Du doan: ', num2str(lblPredictTest), '.'];

    if( lblPredictTest == lblImageTest)
       strLabelImage = [strLabelImage, ' Ket qua dung. '];
    else
       strLabelImage = [strLabelImage, ' Ket qua sai. '];
    end

    title(strLabelImage);
end



function q7(nNumber)
imgTrainAll = loadMNISTImages('./train-images.idx3-ubyte');
lblTrainAll = loadMNISTLabels('./train-labels.idx1-ubyte');

imgTestAll = loadMNISTImages('./t10k-images.idx3-ubyte');
lblTestAll = loadMNISTLabels('./t10k-labels.idx1-ubyte');

Mdl = fitcknn(imgTrainAll', lblTrainAll);

nResult = 0;
```

```
nLabelTest = size(lblTestAll, 1);
for i = 1:nLabelTest
   lblTest = lblTestAll(i);
   if( lblTest == nNumber)
      imgTest = imgTestAll(:, i);
      lblPredictTest = predict(Mdl, imgTest');
      if( lblPredictTest ~= lblTest)
         nResult = nResult + 1;
      end
   end
end
figure;
title(num2str(nResult));
end
```