Assignment 12

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Exercise 1

i. 70000
ii. 28x28
iii. 10 classes

Exercise 2

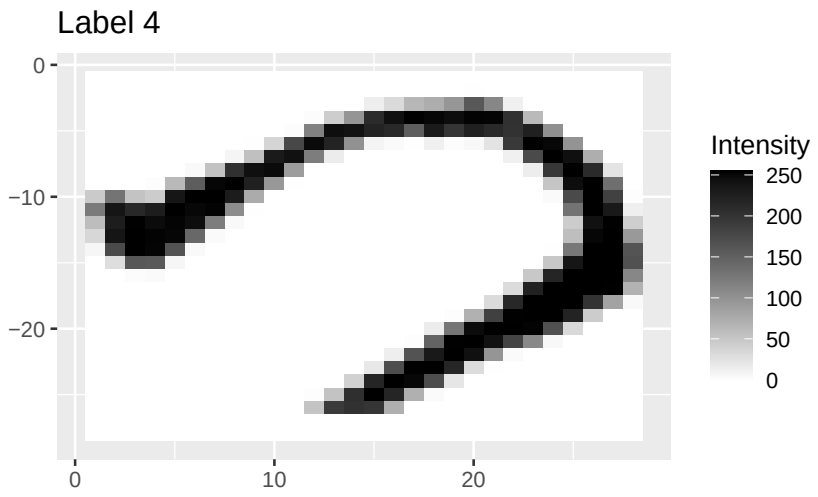
```
train_dl <- dataloader(
  dataset = train_ds,
  batch_size = 32,
  shuffle = TRUE
)
```

Exercise 3

```
## [1]  32 784
```

Exercise 4

-The image corresponds to the character “re.”-



Exercise 5

```
valid_dl <- dataloader(
  dataset = valid_ds,
  batch_size = 32,
  shuffle = FALSE
)

test_dl <- dataloader(
  dataset = test_ds,
  batch_size = 32,
  shuffle = FALSE
)
```

Exercise 6

```
net <- nn_module(
  initialize = function() {
    self$fc1 <- nn_linear(784, 128)
    self$fc2 <- nn_linear(128, 10)
  },
  forward = function(x) {
    x %>%
      self$fc1() %>%
      nnf_relu() %>%
      self$fc2()
  }
)
```

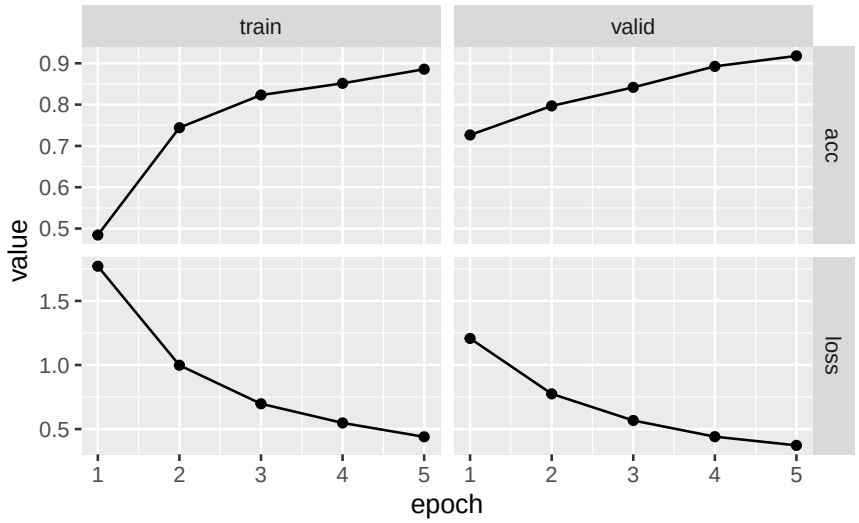
Exercise 7

```
model1 <- setup(
  net,
  loss = nn_cross_entropy_loss(),
  optimizer = optim_adam,
  metrics = list(luz_metric_accuracy())
)
```

Exercise 8

```
## Epoch 1/5
## Train metrics: Loss: 1.7706 - Acc: 0.4844
## Valid metrics: Loss: 1.2073 - Acc: 0.7266
## Epoch 2/5
## Train metrics: Loss: 0.998 - Acc: 0.7441
## Valid metrics: Loss: 0.7749 - Acc: 0.7969
## Epoch 3/5
## Train metrics: Loss: 0.6974 - Acc: 0.8232
## Valid metrics: Loss: 0.5672 - Acc: 0.8418
## Epoch 4/5
## Train metrics: Loss: 0.548 - Acc: 0.8516
## Valid metrics: Loss: 0.4407 - Acc: 0.8926
## Epoch 5/5
## Train metrics: Loss: 0.4396 - Acc: 0.8857
## Valid metrics: Loss: 0.373 - Acc: 0.918
```

Exercise 9



-Looking at the graph, you can see a pattern in which the training loss steadily descends as the epoch passes.

-The validation loss also decreases overall or shows a similar trend, The difference from training loss is not significantly widened, so overfitting does not seem severe.

-Overall, it was a form that showed that the model was being learned stably.

Exercise 10