Practical 2

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1. Materials readed.
2. When the number of epochs stays in default of $1e4$, the values of the three parameters are:

   ```
   weight_1 0.667347
   weight_2 1.114849
   bias     31.632502
   ```

   And the predictions are:

   ```
   id  approx
   1   40.09
   2   43.88
   3   49.89
   ```

   When I changed the number of epochs to $1e3$, the values of these three parameters changed:

   ```
   weight_1 1.834531
   weight_2 −0.236898
   bias     23.250964
   ```

   And predictions in this case are:

   ```
   id  approx
   1   33.31
   2   40.41
   3   47.04
   ```

   Following are the result under $1e5$ epochs. Parameters:

   ```
   weight_1 0.646654
   weight_2 1.115242
   bias     31.984351
   ```

   Predictions:

   ```
   id  approx
   1   40.33
   2   44.03
   3   49.96
   ```

3. I have implemented the least squares solution, it can be found at *least-squares-solution.lua*. And the predictions are

   ```
   id  approx
   1   40.32
   2   44.03
   3   49.96
   ```

   Comparing with the predictions of the linear neuraon trained with SGD, we can find that with the increasing number of epoches, predictions from these two methods become less different. And the predictions of the SGD should mathmatically converge to the result provided by the least square solution.

   As for the parameters, they are shown below:

```
weight_1  0.6501
weight_2  1.1099
bias      31.9807
```

We can find that it appears like the predictions. With the number of epochs increased, the parameters also become less different with the least square solution.