- Execution description:
  在 colab 按全部執行就可以了。

- Experimental results:

  第 1 題：

```
Length of data: 30
Number of positive samples:  15
Number of negative samples:  15
Positive samples:[[-2.3355020600150027, -3.591130431511525, 1], [8.859233165191537, 3.067566309037808, 1], [9.29402367647
Negative samples:[[-5.0639510949468765, 9.220892963876008, -1], [-2.437554217161992, 7.665869962579105, -1], [1.088990944
Data: [[-5.0639510949468765, 9.220892963876008, -1], [-2.3355020600150027, -3.591130431511525, 1], [8.859233165191537, 3.
[[-5.0639510949468765, 9.220892963876008, -1],
 [-2.3355020600150027, -3.591130431511525, 1],
 [8.859233165191537, 3.067566309037808, 1],
 [-2.437554217161992, 7.665869962579105, -1],
 [9.29402367647323, 2.537925446599484, 1],
 [1.0889909446847827, 1.311026412047962, -1],
```

  第 2 題：

```
Length of data: 30
Number of positive samples:  15
Number of negative samples:  15
Positive samples:[[-3.0601434048466025, -8.193324140302359, 1], [9.604031531397428, -2.3167351456226
Negative samples:[[-9.377687050550275, 4.5954823410267736, -1], [8.33791694876609, 6.458534116308623
Data: [[-9.377687050550275, 4.5954823410267736, -1], [8.33791694876609, 6.458534116308623, -1], [-0.
Number of iterations: 2
Final weight: tensor([ 6.2740, -8.7404,  0.0000])
```

```
w0 = torch.tensor([1, 1, 1], dtype=torch.float32)
```

```
====================================================================
Average number of iterations when PLA halts:  4.333333333333333
```

  initial w0 設成 w0 = torch.tensor([1, 1, 1], dtype=torch.float32)
  PLA 經過 2 次 iterations 會停止
  分別用不同的 data 跑了 3 次，平均經過 4.33 次 iterations 會停止。

  第 3 題：

```
w_pocket, error_pocket = pocket_algorithm(data, 150) # set to run 150 times
```

```
  ----- PLA Computation Time = 480.63862599999396ms
  ----- Pocket Algorithm Computation Time = 3846.0358760000017ms
```

  設定 pocket algorithm 跑 150 次，執行時間會大於 PLA

  第 4 題：

```
============================================================================================
Accuracy of Pocket Algorithm with misslabeled data:  0.7894736842105263
Accuracy of Pocket Algorithm with no misslabeled data:  1.0
```

  有 mislabeled data 的準確率為 78.95%，沒有 mislabeled data 的準確率為 100%

- Conclusion:
    1. PLA 一定會停止。
    2. 有 mislabeled 的 data 會造成準確率下降
    3. Pocket Algorithm 設定的 iterations 次數達到一定次數以上，執行時間就會超過 PLA
    4. 當有 mislabeled 的 data 時，會造成 Pocket Algorithm 的準確率下降。

- Discussion:
  需要將觀念搞清楚才有辦法轉換為程式碼，然後因為我是用 Pytorch，需要熟悉 tensor 的運作，而且有遇到資料型態不對的情況。