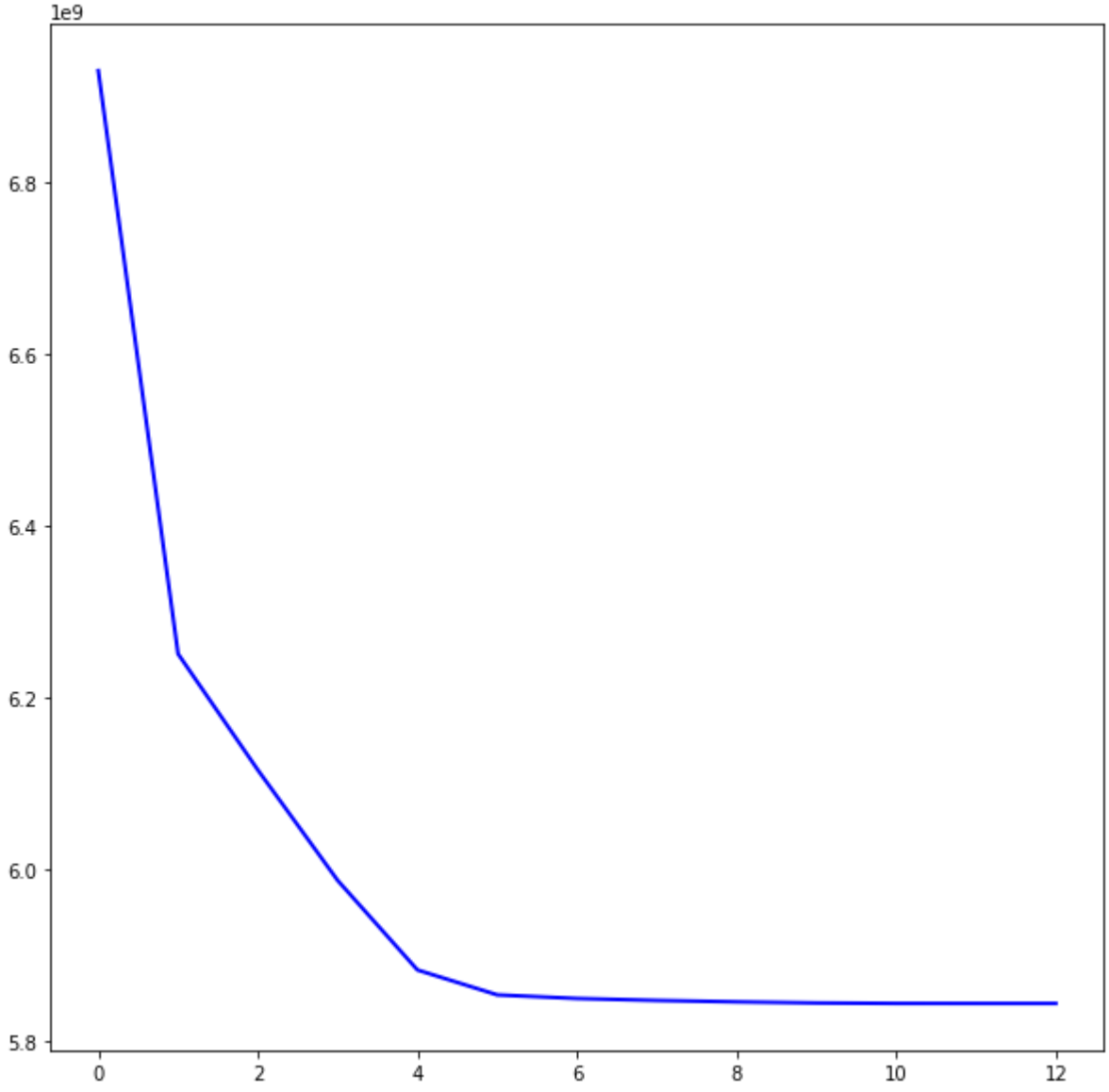
HW_2 Question 3 Report



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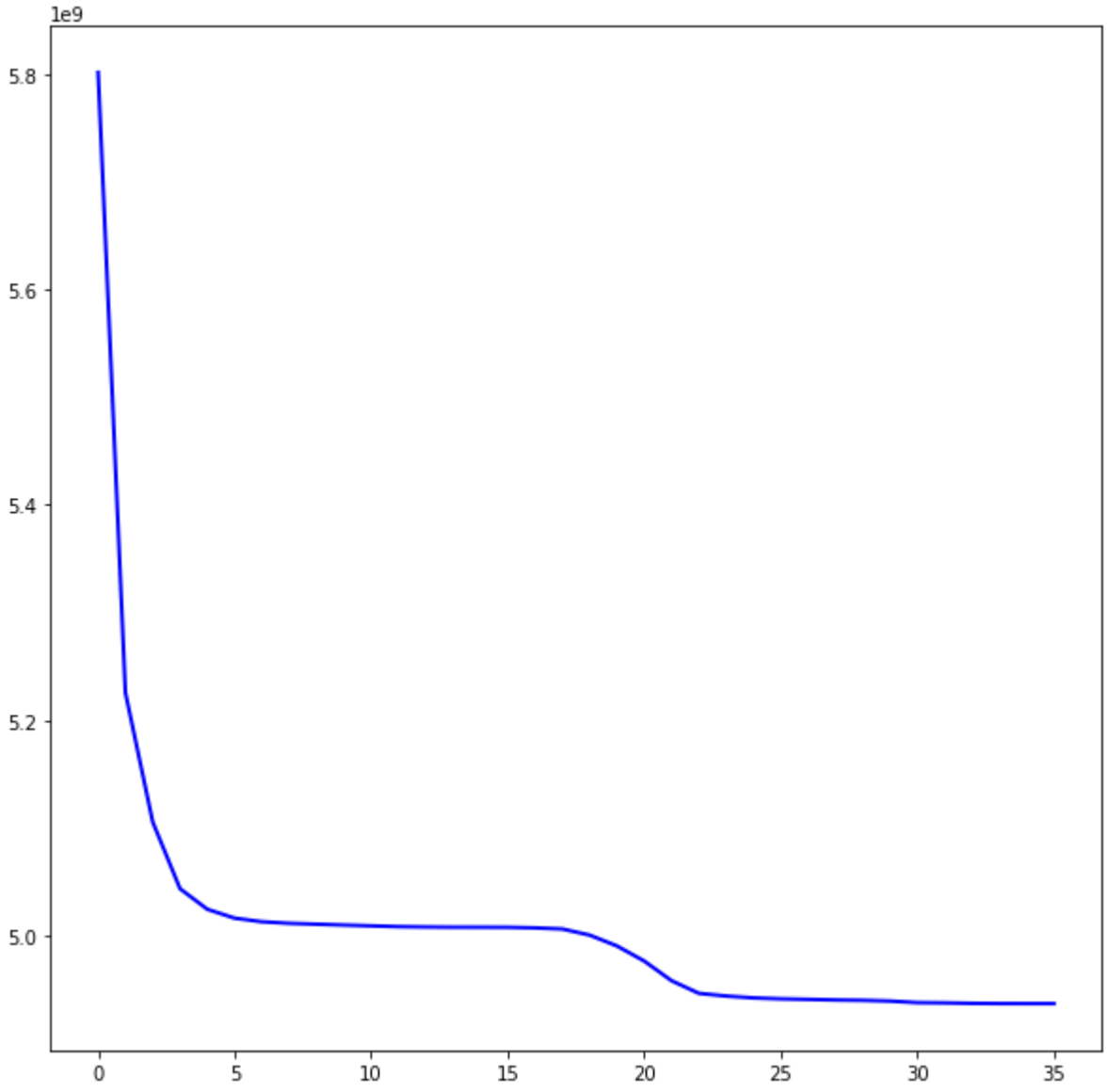
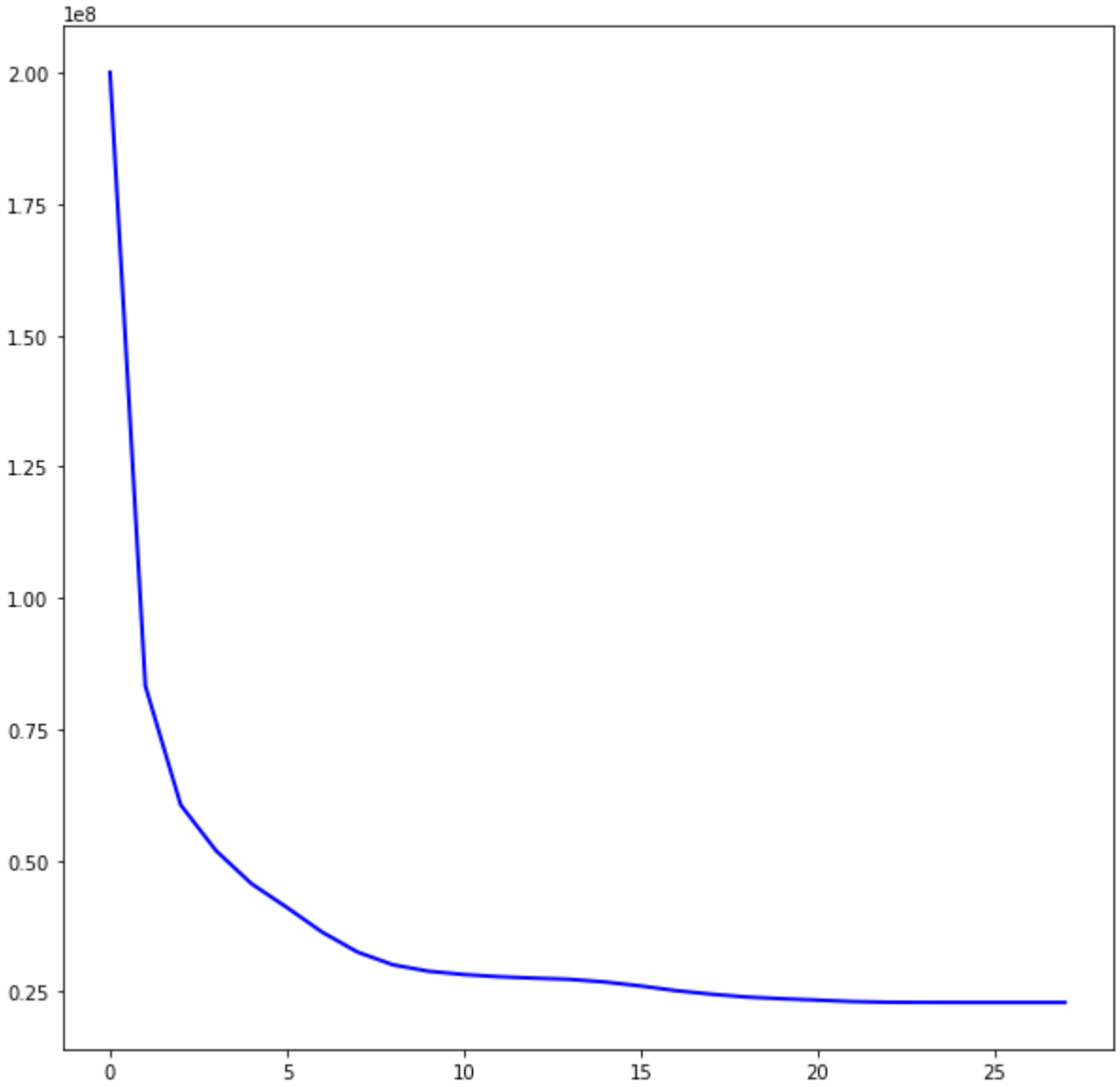





```
Using raw data converged in 13 iteration (371.41 seconds)
Classification accuracy: 0.91
##################
Project data into 73 dimensions with PCA converged in 36 iteration (116.78 seconds)
Classification accuracy: 0.93
##################
Project data into 1 dimension with PCA converged in 28 iteration (48.00 seconds)
Classification accuracy: 0.74
```

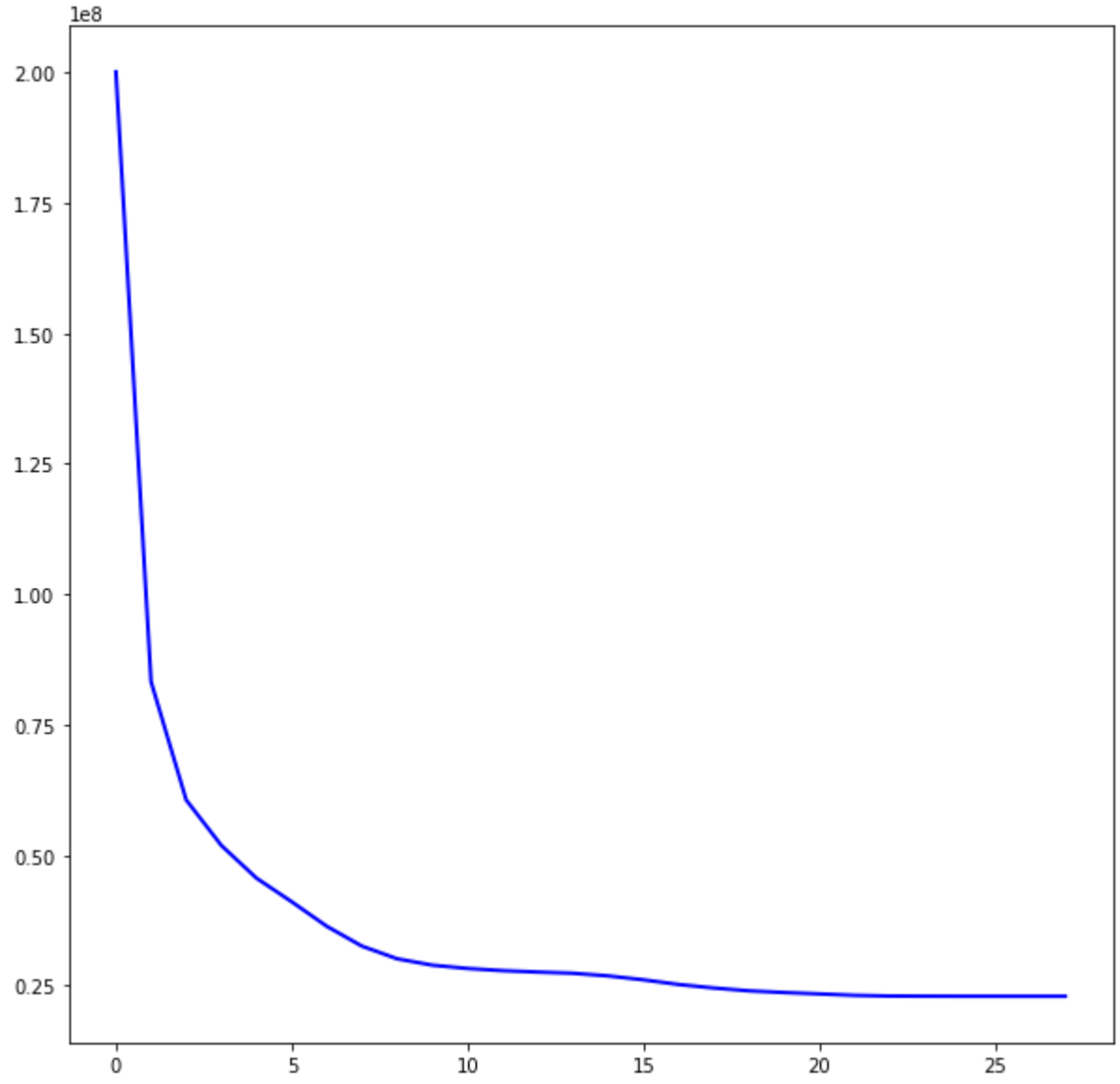
a.

- the number of iterations for convergence : Using raw data converged in 13 iteration
- the classification accuracy on the test samples : Classification accuracy: 0.91
- plot shape following what you expect?

In [3]:

```
fig2 = plt.figure()
plt.plot(np.arange(len(error_history_pca_1)),error_history_pca_1,'b-',linewidth=2)
fig2.set_size_inches(10, 10)
plt.show()

print('Yes. According to the plot, the convergence appears around 34.')
```



Yes.

b.

- How many dimensions are necessary in this case? 73 dimensions with PCA converged in 36 iteration.

- Does PCA help clustering? Explain. (Hint: Consider both the classification accuracy and the runtime of the algorithm.) Yes. it do dimensionality reduction and decrease the time for the model

C.

- Are the results better? Explain.

  No, Project data into 1 dimension with PCA converged in 28 iteration (48.00 seconds) Classification accuracy: 0.74 so the number of iteration is larger and the accuracy is less than the privous ones

In [ ]: