**CPSC 483 FINAL EXAM**

**DUE DATE**: **Tuesday, Dec 24, 11:59 PM**

**Points to be noted:**

* But you should normalize the data, calculate covariance, etc. yourself. Only major change from previous projects is that you can use **linalg** or such function for pca and svd. If you have a question about which package can be used, please email me. The idea is to use as less packages as you can.
* You can use the PCA starter code that I uploaded on Titanium.
* Missing anything from the “things to do” below will result in losing points.
* Finally, coding is an art. 20% of the grade is for how perfect your code is, not just that is working and doing everything! Tips for perfecting your code is to vectorize (use matrices instead of loops) where ever possible, make it more efficient where ever possible, having perfectly labeled plots, etc. While every student cannot have everything of these, but if you strive to achieve a majority of this, you would earn this 20%.

**Things to do:**

1. Perform normalization, the necessary preprocessing step. //Done
2. Use PCA and SVD on the dataset given below. //Done
3. Reduce the dimensionality to 2 dimensions. //Done
   * Display the principal components from both PCA and SVD.
   * Are they the same ? You can answer this in the output.
4. Project the original data instances (points) onto the principal components resulting from both SVD and PCA. //Done
   * Are they the same ? You can answer this in the output.
5. Plot the two principal components from SVD ( PC1 and PC2) and the projections onto them of the original data.
6. Project the features (dimensions) onto the principal components and print out the resulting array. //DONE
   * **short answer, explaining what features’ essence is captured by PC1 and PC2, and what are they signifying.**
   * Remember, when you reduce the dimensions, the new dimensions carry the weight or essence of the more than one original dimension or feature.

**Deliverables:**

1. **All items in things to do above, such as (perfect!) code,**
2. **Plot figures (Output from running the code),**
3. **Output printed from running the code, answer to question 3 above, etc.**

Submit item 1) above, in Titanium by **Tuesday, Dec 24, 11:59 PM**