1. **Describe the data collection process. Make sure it is thorough and unambiguous; imagine you are submitting a paper to a conference or demoing a commercial system: You want to cover your bases. Here are some questions you may want to answer:**
    a. **Who were the research subjects?**
    All of the group members - Sophie, Mary and Tim.

    b. **What activities were being performed?**
    Ascending stairs, walking, sitting and jumping.

    c. **How long were the activities performed?**
    2.5 minute segments adding up to 5.

    d. **How did they hold their phone?**
    They put the phone in their back pocket.

    e. **How did they perform the motion?**
    Ascending Stairs: They ascended the stairs with approximately 2 seconds of walking on a flat ground in between the stairs for each floor.
    Jumping: They jumped off the ground 2 inches by pushing off from their toes. Arms were by our sides.
    Walking: They walked on flat ground at a normal pace in a straight line. Arms were relaxed, moving slightly in opposition of the moving legs.
    Sitting: They sat still in a chair.

    f. **Did you account for variation in the phone position/orientation and the activity style? We don't expect that your application works with the phone in any position/orientation, but we do expect you to be clear about when your application is expected to work.**
    Yes, we decided to put the phone in our back pocket at a fixed direction for each activity.

2. **Which classification algorithm and parameters did you select in your final system? Why?**
    k-NN with 3 neighbors because it worked the best.

3. **How did the classifier perform initially? Try at making at least two changes to the model (use different features or different parameters to the classifier) and report how the results change.**
    We changed our classifier to have n-neighbors equal to 4, and 2 and they did both worse than with 3. We also looked at the Decision Tree classifiers and despite those working better for A2.0, the k-Nearest Neighbors worked best on this real data.

4. **Describe your results. Report the accuracy, precision and recall metrics for the classifier and features you decided to use. How do the results compare to the results on the sample data? Briefly speak to how well your algorithm works in practice, drawing on the empirical results. Do they match up?**

   accuracy_scores: 9.5704662104362708
   precision_scores: 6.7471988795518207
   recall_scores: 6.510640519274796

   These results are better than the sample data, and we ended up finding that nearest neighbors worked even better than the decision tree classifier we had used in A2.0. Ascending stairs, jumping, and sitting all work very well, however walking does not work very well. We are thinking because it is because of the platforms in the stairs at the library. So in this case technically part of our stairs data is walking but it would be very hard to stop and start the collecting on those platforms or have continuous stairs.