The purpose of this lab was to determine how accurate our GPS receivers were when they were completely still for an hour (or more) and to determine the effects of “noise” on that accuracy. Data was collected in NMEA format with WAAS disabled. WAAS stands for Wide Area Augmentation System, and it’s a system made up of a combination of ground stations as well as satellites that provide GPS signal corrections. WAAS is accurate to within 3 meters 95% of the time. Had WAAS been enabled, I think my GPS would have been a bit more accurate in determining my position.

I planned to collect my data while sitting in Mathey quad, but, unfortunately, I picked a terrible day. I sat on a bench for about 7 minutes in the freezing wind before the first snowflakes began to fall. My receiver, laptop, and I relocated inside my room where I hung my GPS out of my window. I was able to get reception from about 4 satellites consistently, and I just let my GPS run for about two hours. I noticed that my receiver occasionally lost satellite signal, as I frequently checked it, but all in all, it maintained contact for a large part of the 2 hours.

I took the data I received and put it into Excel spreadsheet form to map different position and altitude readings that my GPS took at different times. Then I used that data to determine the deviation from the average latitude, longitude, and altitude as well as computing standard deviation for those three. My average latitude was 40.3485469, average longitude was 74.661346, and my average altitude was 68.3045016 m.

The standard deviation for latitude was 8.2161861 m, which I didn’t think was too big at all. Latitude deviations (in meters) and time are plotted together:

![Latitude Deviation vs. Time](http://www.garmin.com/aboutGPS/waas.html)
The standard deviation for longitude was 5.7931720 m. Longitude deviations (in meters) and time are plotted together:

![Longitude Deviation (m) vs. Time (s)](image)

The standard deviation for altitude was approximately 6.22 m. Altitude and Time plotted together:

![Altitude Deviation (m) vs. Time (s)](image)

Altogether, I felt that my GPS receiver was relatively accurate in determining my position. When graphed, the map showed me to be in Holder courtyard, when in actuality I was in my room in Campbell (see pink dot).