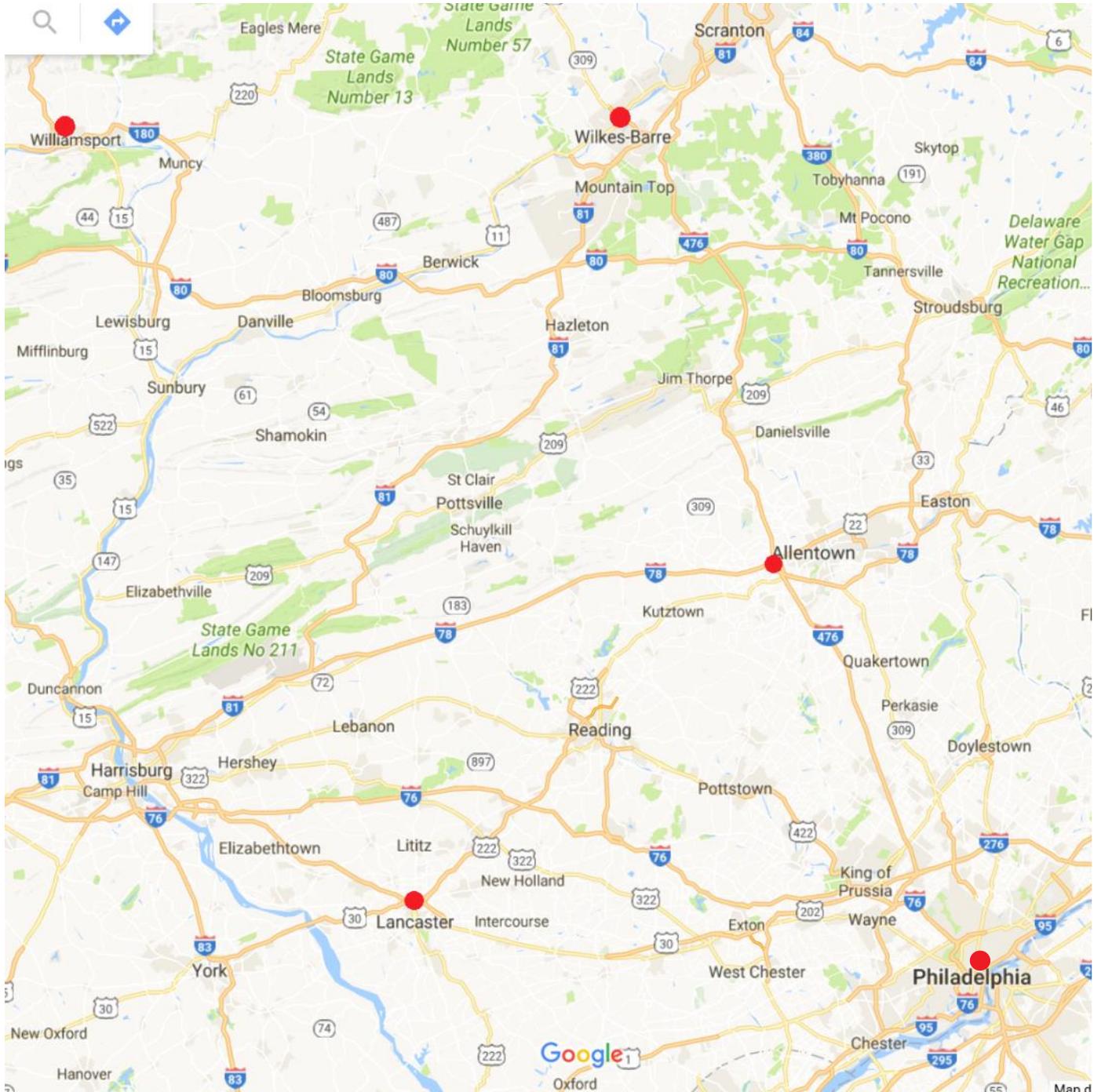


# HIP 02

## COMMENTS:

- Problem 1 will be graded based off of the HIP rubric.
- Problem 2 is a list of suggested Student Workbook Volume 1 problems to practice in your spare time. You do not need to turn these in, they will not be graded.

(1) I grew up in Allentown Pennsylvania, and while taking flying lessons I was required to do a "cross-country" flight. I planned out my flight as follows: I left Allentown and flew directly to Lancaster, then directly to Williamsport, then Directly to Wilkes-Barre, and then finally directly back to Allentown.



- a. No one knows where Allentown is (unless you enjoy Billy Joel). Thus I usually use Philadelphia as my reference point to help people get a feeling for where I used to live. Use Philadelphia as the origin of your coordinate system. Draw the position vectors to each of the locations (Allentown, Lancaster, Williamsport, and Wilkes-Barre). Be sure to clearly label them, (e.g. the position vector pointing to Allentown could be called  $\vec{r}_0$  ).
- b. Draw the displacement vector between each leg of the flight (e.g. Allentown to Lancaster, Lancaster to Williamsport, Williamsport to Wilkes-Barre, and Wilkes-Barre to Allentown). There will be 4 in total. Be sure to clearly label them so that your labeling convention is consistent with the position vectors you have already defined.
- c. The flight took me a total of 3.2 hours. What was my average velocity for the trip? Also, what was my average speed? The conversion factor for the chart is: 1.69 cm = 1.0 miles. Be sure to show your work for this part.
- d. Now consider the scenario where a friend of mine wants to travel the same exact flight path, but has a faster plane and wants to arrive back at Allentown at the same time I get back. If his plane is able to fly at an average speed of 100 mph, how long should he wait at Allentown after I initially leave?
- e. As we are both in the air, how does the distance along the flight path between us decrease as a function of time:
  - i. It does not decrease.
  - ii. It decreases linearly.
  - iii. It decreases quadratically.
 (Hint: Make a nice big scaled graph to help answer this).
- f. Enhancement. (Think vectors; position, displacement, average velocity. Also graphs).

(2) CH 1: 1, 2, 3, 4, 19, 20, 21

CH 2: 2, 4, 5, 7, 9, 12, 15, 20

CH 3: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24