Please provide complete and well-written solutions to the following exercises.

Due October 2, at the beginning of class.

(Remember to also read the syllabus by noon PST, October 2.)

Assignment 1

Exercise 1. Find the length of the following vector: $(1,2,3) + 2 \cdot (2,3,4)$.

Exercise 2. Find the unit vector which points in the same direction as $(1,0,3)$.

Exercise 3. Find the unit vector which is obtained by rotating the vector $(1,0)$ in the plane by an angle of $2\pi/3$ counterclockwise around the origin.

Exercise 4. Compute $\sum_{n=0}^{\infty}(2^{-n}, 3^{-n})$.

Exercise 5. A person is standing on the earth. She walks 1 mile south. She then turns right and walks 1 mile west. She then turns right and walks 1 mile north. She has now returned to her starting location. What is her starting location?

(There are technically several correct answers; it is sufficient to provide one answer.)

Exercise 6. In this problem, we can treat velocities as vectors. For example, if an airplane is moving forward at 500 miles per hour (mph), then we can represent the velocity as a vector v of length 500 pointing out of the nose of the plane. Then the speed of the airplane is the length of its velocity vector. In this way, two velocities add. For example, if w is a vector, and if the velocity of the wind itself is w, then relative to the ground, the airplane will move with velocity $v + w$.

Suppose the airplane is traveling at 500 mph and a gust of wind blows from the right of the plane to its left with a speed of 100 mph. What is the new speed of the airplane now?

Exercise 7. Suppose we know that the following points in the plane form a parallelogram: P, $(7,8)$, $(5,4)$ and $(2,2)$. Find P.

(There are technically a few correct answers; it is sufficient to provide one answer.)

Exercise 8. Determine whether or not the following points form a parallelogram: $(0,0,0)$, $(1,0,0)$, $(1,2,1)$, $(3,4,2)$.