College of the Holy Cross, Spring Semester, 2011
Department of Mathematics and Computer Science
Problem of the Week #3: April 12, 2011

True Story Between Osaka and Kyoto Japan run two kinds of train, the ordinary passenger trains (run by *Hankyu*, *Japan Railways* (JR), and others), and the *Shinkansen* ("bullet train"). One day in 1995, while riding the *Hankyu* railway to Kyoto, I saw a bullet train go by, in the same direction, overtaking us so rapidly that we might have been stationary, though our train was travelling at its maximum speed. Naturally, I wondered how fast each of us was going, but there the matter sat due to insufficient data.

Months later, on the same line, we were again overtaken by a *Shinkansen*. This time, I noted that it took about 15 seconds for the *Shinkansen* to pass us. Watching the scenery go by, I realized that if I another *Shinkansen* passed us in the opposite direction, I could deduce **both** of our speeds. Obligingly, this occurred about two minutes later; it took about 4 seconds for the oncoming trains to pass.

Problem 3 A *Shinkansen* is about 1000 feet long (five cars of 200 feet each). Assuming all trains travel at constant speed between Osaka and Kyoto, how fast does a *Shinkansen* travel, and how fast is a *Hankyu* train?