

RDM Manufacturing
21 Bridge Street
Queens, NY 11356

April 2, 2015

Calculus II Student
Adelphi University
1 South Ave
Garden City, NY 11530-0701

Dear Sir or Madam:

Given your outstanding performance in your previous project, our company would like to hire you for another consulting job. As before, our engineers are extremely busy and don't have time to assess the following situation.

For the last two months our medical research facility has been monitoring a certain coyote's behavior. The animal has somehow become sentient and has developed an anxiety disorder centered around a series of recurring nightmares.

The scenario is nearly always the same. The animal is standing at the end of a road that is 1 kilometer long (for some reason the road has those little green kilometer markers on it), and there at the other end is an antagonizing roadrunner, just standing there, sticking his tongue out. As the coyote starts to go after the bird, he can only run in slow motion, about 1 meter per second. After one second, the road stretches **uniformly** and instantaneously by 1 kilometer so now that pesky fowl is 1998 meters away, since some of the stretch happens behind him. The coyote claims he tries to speed up, but is always moving in slow motion, at 1 meter per second. After another second, the road stretches again by 1 kilometer so that now the bird is 2995.5 meters away! And this just keeps on happening. Over, and over. And over. And over. Well, you get the idea. Of course when the canid awakens, he is hungry and frustrated.

Our medical research team believes that knowing if the coyote catches the Roadrunner can help alleviate the animals anxiety. In particular, does he have any chance of catching the bird? If so, how long does it take? Should he take a snack to eat along the way?

Most of the dreams aren't that specific. Usually, the coyote doesn't know how long the road is to begin with, or how fast he's moving. All that is really known is that he's always moving at the same slow rate, and the road stretches uniformly and instantaneously by its original amount after each second. The above scenario is the best formulation of the experience our engineers could do with their limited time and energy.

I need you to write up a full report to our team of engineers. As before, they are interested in the mathematics, so make sure you explain your ideas and give citations.

We have also rehired a writing consultant, Anustha Shrestha, to help with the write-up of this project. Please seek her help if you have any questions.

I know you probably have Spring fever, but I will need your report by May 4.

Yours Faithfully,

Roy D. Mercer