1) Braking. (These aren’t meant to be tricky, so don’t over-analyze)
   a) Suppose you are traveling at 60mph on the highway and you notice an
      unexpected road block. If your reaction time is 0.4s, how long do you travel
      before you begin to brake? If braking follows immediately at 0.9g, how long
      do you travel before you stop? What if only 0.5g is possible due to road
      conditions? 0.3g?
   b) Assuming the parameters from problem 2, what braking force is required to
      decelerate the vehicle at 0.5g. Simulate the car braking at 0.5 g and compare
      the stopping distance to what was predicted in part a. Now add air-drag and
      rolling resistance – what is the stopping distance (show plots).
   c) Federal Motor Vehicle Safety Standard 121 (FMVSS 121), which governs
      vehicles with air brakes, mandates that a loaded straight truck should be able to
      stop from 60mph in a distance of 310 feet. To what constant deceleration rate
      does this correspond? Assume no time delay.
   d) Let’s say that your car has a cg height of 0.5m, a wheelbase of 2.5m and a 50-
      50 weight balance between the front and rear. If the tire/road interface has a
      peak friction coefficient of 0.9, you have no ABS system and you want to
      avoid locking the wheels, what peak deceleration can you achieve if you have
      ideal proportioning? If you have no proportioning?

2) Download the braking data from the website. Assume the effective radius of the wheel
   is 0.35 m.
   a) For the first set of data, plot the GPS Velocity and Tire Velocity (“hold on”) on
      the top half of a page (“subplot(2,1,1)”). Plot tire slip vs time on the bottom
      half of the page (“subplot(2,1,2)”). Any ideas what the “blip” in the data is due
      to?
   b) For the second set of data, plot tire slip vs. time. Then plot the tire slip vs.
      Force (mass of the car in 1500 kg). Estimate the tire’s longitudinal stiffness.