1. Two couples are on a double date in Austin. They decide to get a pedicab to take them from Downtown Austin along a 4 kilometer route to Zilker Park for Blues on the Green. However, the pedicab can only accommodate one couple at a time, so two pedicabs are needed. The couples tell the pedicab drivers the one who gets to Zilker Park the fastest will get the biggest tip! Both couples are wearing GPS watches that record data about their ride. The first row gives the time (in seconds) after the race begins The second and third row in the table gives the distance of the couple along the route (rounded to the nearest meter) to Zilker Park. Note: the data is not always recorded at regular intervals.

Time (seconds)	0	30	60	70	80	110	120	130	140	165	180	200	300
First Couple (meters)	0	92	186	225	272	415	460	502	533	610	670	752	1115
Second Couple (meters)	0	98	182	220	280	415	472	516	555	632	704	765	1160

(a) Develop notation for the problem that will assist when determining who is winning the race. What are quantities that might be changing? What quantities might be important to you? What do each of these quantities depend on?

(b) Who was ahead 5 minutes into the race?

    i. The first couple
    ii. The second couple
    iii. Cannot be determined

(c) Suppose we let $F(t)$ represent the first couple's distance along the route t seconds after the start of the race. In the context of this problem, what does the quantity $(F^{-1})(150)$ represent?

    i. The distance (in meters) the first couple has traveled after 150 seconds.
    ii. The distance (in meters) between the first and second couple after 150 seconds.
    iii. The time (in seconds) it takes the first couple to travel 150 meters.
    iv. The time (in seconds) it takes to for the first couple to be 150 meters in front of the second couple.

(d) Calculate the second couple's average velocity between 70 and 80 seconds.

    i. 60 m/sec
    ii. 60 sec/m
    iii. 6 m/sec
    iv. 6 sec/m

(e) Suppose the second couple had traveled at an average velocity of 3.82 m/sec for the first 5 minutes. Comparing this to the data in the table, one could conclude:

  i. They would have traveled 14 meters more in the first 5 minutes than what the table shows.

  ii. They would have traveled 14 meters less in the first 5 minutes than what the table shows.

  iii. There is not enough information to actually decide if they would have traveled more or less distance than what the table shows.

(f) Of the answers that follow, which one is the best estimate of the first couple's instantaneous velocity two minutes into the race.

  i. 4.35 m/sec

  ii. 4.2 m/sec

  iii. 4.5 m/sec

  iv. 3.65 m/sec

(g) Suppose we let $S(t)$ represent the second couple's distance along the route t seconds after the start of the race. Of the answers that follow, which one is the best estimate for $S'(180)$?

  i. 3.925 m/sec

  ii. 4.8 m/sec

  iii. 4.45 m/sec

  iv. 3.05 m/sec

  v. 3.75 m/sec

(h) In the context of this problem, what are the units for the quantity $(F^{-1})'(150)$?

  i. meters per second per second

  ii. seconds per meter per meter

  iii. meters per second

  iv. seconds per meter

(i) Which pedicab was traveling faster **exactly** one minute into the race?

  i. The first couple

  ii. The second couple

  iii. Cannot be determined

(j) In describing the race later, the first couple states that their average velocity during the entire race was 3.8 meters per second, while the second couple says that after the first 5 minutes, their average velocity for the rest of the race was 3.6 meters per second. Assuming their statements and the table of values above are accurate, whose pedicab driver got the largest tip?

  i. The first couple's driver

  ii. The second couple's driver

  iii. They tied, both got the same tip

  iv. Not enough information