Homework 6

February 27, 2009

1 Arc Length

Instructions : You are encouraged to work out solutions to these prob- lems in groups! Discuss problems with your classmates, the tutors and/or the instructors. After doing so, please write up your solutions legibly on a separate sheet (or sheets) of paper, showing all of your work (this part should be done on your own). When you are asked to give explanations, be sure to use complete sentences. You are welcome (and sometimes encouraged) to use calculators or computing devices.

Problem :
Pepito didn't do his Math homework and his father, Merlin, got very upset. Merlin punished Pepito by shrinking him and turning him into a two dimensional guy and putting him on a Cartesian plane on the origin, that is point $(0, 0)$. Pepito is big enough that a step of Pepito is a unit in the Cartesian plane (that is a step to the right would take him to the point $(1, 0)$, a step up would take him to the point $(0, 1)$). Merlin told Pepito he would need to pass three trials before he can get his third dimension back.

1 The first trial is for Pepito to walk along the curve $y = (2x + 1)^{\frac{3}{2}} - 1$ until he reaches $x = 4$. How many steps must Pepito make to this? (Note: Pepito can take decimal steps, such as 0.2 steps).

2 Merlin now tells Pepito to go back down to the origin. The second trial is to run 13 steps up the same curve. How long did he travel along the x-axis, that is what is the value of x after 13 steps?

3 The trials have been very easy for Pepito so far, he only had to walk a bit. But now Merlin wants Pepito to prove he knows some geometry as the third and final trial. So he asks Pepito. "When you walked up the curve the first time (problem 1), if you had walked up directly to the goal (on a straight line) how many steps would you have needed?" and Merlin also asks "When you walked up the curve the second time (problem 2), if you had walked up directly to the goal (on a straight line) how many steps would you have needed?"
Help Pepito answer these two questions so that he can be "normal" again.