Name: Date:

Pre-Calculus: 3rd quarter project!

Due: March 25, 2013

In this project, you need at least 5 piecewise functions showing a possible roller coaster. You need to show the graph and a proof that the function you generate is continuous and differentiable at the points where the curves split into each piece. You may use any type of function we have discussed including linear, trigonometric, exponential, logarithmic, inverse trig, and polynomial. This is how you will present it: It is best to generate it on your calculator with 5(or more) piecewise functions. Once you have it complete, you will do the following:

1. Transfer it to a piece of poster paper. It can be drawn freehand but it should look like what you have on the calculator. Tape or glue several pieces of poster paper together horizontally (I highly suggest the posterboard paper that already has the grid on it – or make the grid yourself!
2. Below each of your 5 (or more) curves, **write its function (including its domain).** Use a heavy dot to **show the transition points** between the functions.
3. On the poster paper itself, show that the curves are continuous and differentiable at those points.
4. **Calculate** the “thrill factor”\* for your coaster.
5. You will then cut out the roller coaster so that the top of it is your track.
6. Then tape or glue one end of the poster paper to the other end. You will end up with a 3-dimensional representation of your roller coaster.
7. Name your roller coaster.

\*The “thrill” of a drop is defined to be the angle of steepest descent in the drop (in radians) multiplied by the total vertical distance in the drop. The thrill of the coaster is defined as the sum of the thrills of each drop.  To find the **thrill** angles: Locate the top and bottom of the steepest drop and find the angle that segment makes with the horizontal.

Things to remember:

1) Your roller coaster should end at the same height it starts. You may want to have a horizontal line for your loading area. This does not count as one of the 5 curves.

2) Roller coasters never get as high as its previous high point. I will not take off for this but you may wish to keep it in mind.

3) Are you good enough to actually put in a loop?

Please do not wait until the last minute – this project will take some time.