Zero G

Math 1010 Group Project #2

Form a group: (<u>no more than 3 per group</u>)

<u>Due by</u>: Due by the beginning of class, Friday, January 10th.

Late Projects Will Not Be Accepted!!

<u>Requirements</u>:

- **An ELECTRONIC COPY of your project must be placed on your SLCC portfolio website in order to receive a score.**
- **Must be turned in by due date (no projects accepted late)**
- **Points for neatness apply. Typed, where possible.**
- **ALL members of the group must contribute equally.**
- **Each person must do their own reflection (#6).**

Point Breakdown:

- **10 points per question (6 questions)**
- **20 points for neatness/labeled graph/use of a ruler/etc.**
- **10 points for typing where possible**
- **10 points for a TYPED cover page**

Height of a Zero Gravity Parabolic Flight

Math 1010 Intermediate Algebra Group Project

Have you ever wondered what it might feel like to float weightless in space? One way to try it out is to fly on a special aircraft that astronauts use to train for their trips to space. Both NASA and the Russian Space Agency have been flying these for years. The way this is accomplished is to fly to a high altitude, drop down to gain speed, and then start a large parabolic path up in the sky. For a time ranging from 10 to 20 seconds, along the top part of the parabolic flight, an environment simulating zero gravity is created within the plane. This effect can cause some nausea in the participants, giving rise to the name "Vomit Comet", the plane used by NASA for zero-G parabolic training flights. Currently there is a private company that will sell you a zero-G ride, though it is a bit expensive.

This lab will have you take a look at the parabolic path to try to determine the maximum altitude the plane reaches. First, you will work with data given about the parabola to come up with a quadratic model for the flight. Then you will work to find the maximum value of the model. Now for the data:

Height of a Zero-G Flight t Seconds After Starting a Parabolic Flight Path

Time *t* in seconds	2	20	40
Height *h* in feet	23645	32015	33715

To find the quadratic model, you will be plugging the data into the model $h = \mathrm{at}^2 + \mathrm{bt} + \mathrm{c}$. The data points given are just like x and y values, where the x value is the time *t* in seconds and the y value is the altitude *h* in feet. Plug these into the model and you will get equations with a, b and c.

Part 1: Write your 3 by 3 system of equations for a, b, and c.

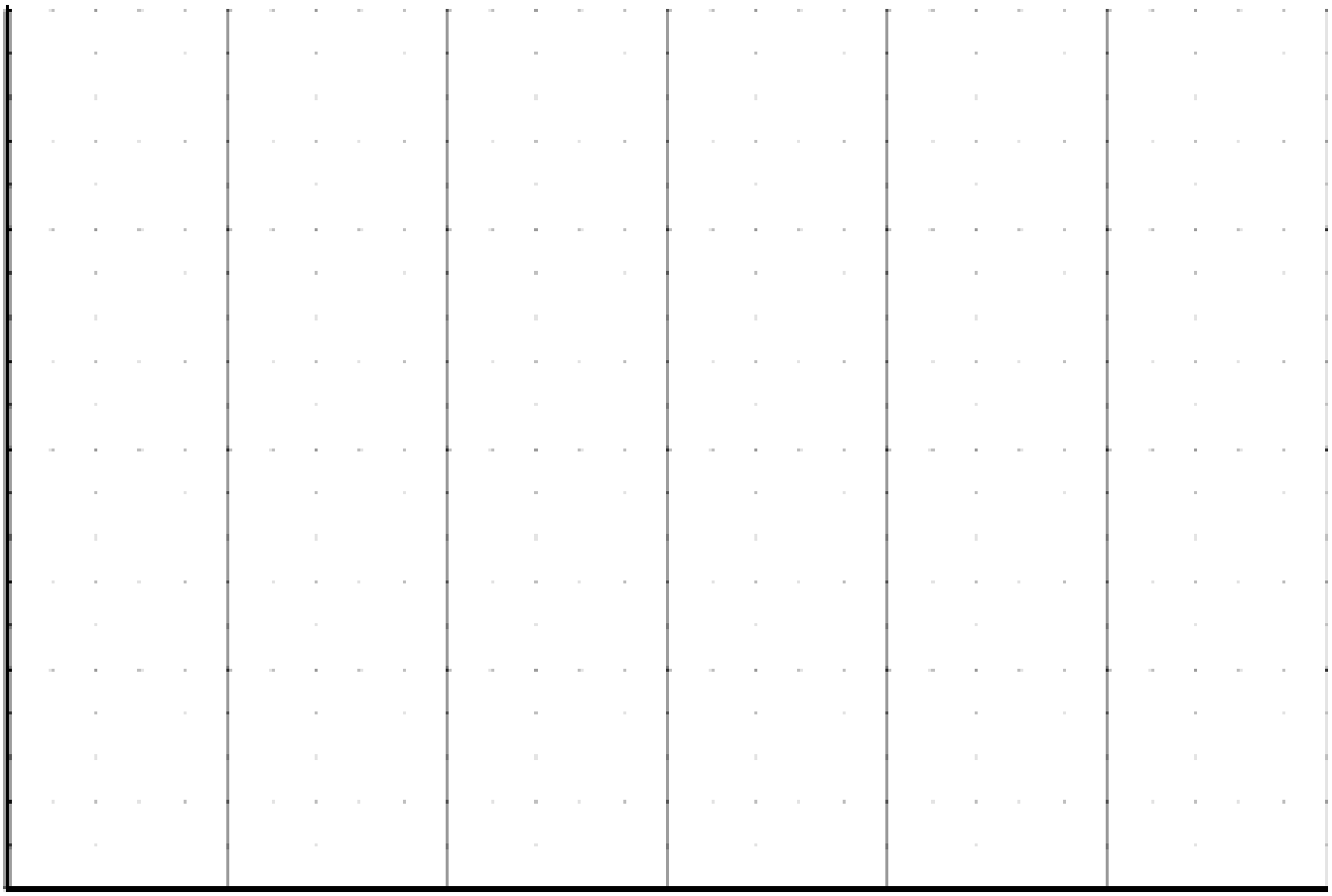
Part 2: Solve this system. Make sure to show your work.

Part 3: Using your solutions to the system from part 2 to form your quadratic model of the data.

Part 4: Find the maximum value of the quadratic function. Make sure to show your work.

Part 5: Sketch the parabola. Label the given data plus the maximum point. A good way to start labeling your axes is to have the lower left point be (0, 20000)

Part 6:



Reflective Writing. **(Paragraph form, typed, using complete sentences and expressing your thoughts)**

Did this project change the way you think about how math can be applied to the real world? Write one paragraph stating what ideas changed and why. If this project did not change the way you think, write how this project gave further evidence to support your existing opinion about applying math. Be specific.