MT 1800 Calculus I
Course Activity: Air Traffic Control Project (BONUS Project)

Name: _____

Due: _____   <u>Points</u>: Extra Credit

<u>**Procedure**</u>**:** This project must be a typed, narrative report. It will be an individual submission, but you may talk to others in the class to share ideas. Be creative—embed the report in a "story"; make this a fun report to read! Give your answers to at least two decimal place accuracy.

Air Traffic Control

Northwest flight 865 is traveling from Minneapolis to New Orleans, and United flight 366 is traveling from Los Angeles to New York. Both flights are at 33,000 feet, and the flight paths intersect over Ottumwa, Iowa. At 1:30 p.m. (Central time), the Northwest flight is 32 Nautical miles (horizontally) from Ottumwa and is approaching it on a heading of 171 degrees at a rate of 400 knots. The United flight is 42 nautical miles from Ottumwa and is approaching it on a heading of 81 degrees at a rate of 450 knots.

Here are some questions to consider as you analyze this situation. (You may use *Mathematica* in your analysis. Please attach your *Mathematica* notebook to the back of your narrative report.) A more detailed breakdown of the expectations is given on the back of this sheet.

- At this instant (1:30pm), how fast is the distance between the planes decreasing?

- How close will the planes come to each other? Will they violate the FAA's minimum separation requirement of 5 nautical miles? Will they collide if Air Traffic Control does not take action to separate them? If they will not collide, which plane will pass over Ottumwa first?

- What time will it be at the time of closest approach? What action(s) could be taken to insure that the planes do not violate the FAA's minimum separation requirement? Be specific.

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Grading Rubric

Procedure: Be sure your report covers all the topics listed in this rubric.

Staple this sheet to the front of your project.

1. Your narrative should include answers to the following questions and an analysis of your answers. Your analysis should specify the functions you used and how you used them. Give your answers to at least two decimal place accuracy. (You may use *Mathematica*.)

    a. At 1:30 p.m., how fast is the distance between the planes decreasing?

    b. How close will the planes come to each other?

    c. Will they violate the FAA's minimum separation requirement?

    d. Will they collide if Air Traffic Control does not take action to separate them?

    e. What time will it be at the time of closest approach?

    f. Which plane will pass over Ottumwa first?

    g. Do you think there is enough time for Air Traffic Control to take appropriate action? What action could be taken?

2. Your report must also include the following items:

    a. Diagram of situation

    b. Graphs of functions used in your analysis—including function giving distance between the two planes.

    c. Definitions of heading and knot.

3. Style Credit

    a. Creativity

    b. Overall quality

Extra Credit Score on Project: _____