

Name:

UMID:

NOTE: The provided files DO NOT require any change except for N and SHOW\_WHAT

**Question 2: For Euler (N=50,100) and for improved Euler (N=50), describe the unexpected phenomenon you see in the graph (no need to include a printout of the graph):**

**Question 3: For Euler, what N should one choose to work with, N=50 or 100 or 1000 or none of the above?**

**Answer the same question for improved Euler (Graph printouts are not needed):**

**Question 4: Comment about the difference between the linear and the non-linear solution for  $\theta_1$  and  $\theta_2$ . Which one is better? Explain why based on the assumption allowing us to "linearize" the equation:**

**Question 5+6: In theory, if  $\theta_1 + \theta_2$  is a solution, what should we get when plugging in the RHS?**

**For the linear case: what is the biggest value of the RHS according to the plot?**

**Is it good or bad? Compared to what?**

**For the non-linear case: what is the biggest value of the RHS according to the plot?**

**Is it good or bad? Compared to what?**

**Conclusion: comment about each of the following:**

**Which approximation is better Euler or Improved Euler? Explain the result of Q3 based on the notion of “order of a method”:**

**What kind of initial conditions work better with linear approximation in this problem? Why?**

**For which kind of equation should we expect superposition to work in theory?**