

# Math 352 Quiz 4

Kai Chang

There are mainly two reasons of why Runge-Kutta methods are popular.

- The method is one-step, meaning that simply one initial value would be enough to work.
- The method is adaptive as far as  $\Delta t$  is concerned. In particular, imagine there are two methods where one has a lower-order accuracy and the other has a higher-order accuracy. Then we can approximate the error caused by the less accurate method by taking difference between the values approximated of the two methods since the other one is more close to the real value. By examining the error, we can adjust  $\Delta t$  dynamically to improve computational efficiency because in doing this we can see whether a method with higher accuracy is too much for our practical use.