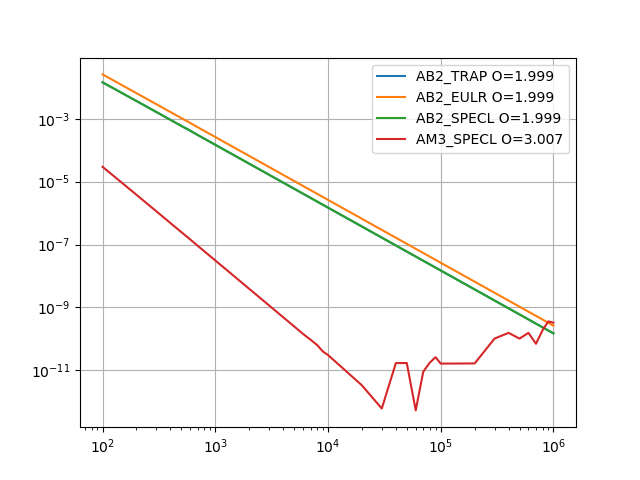
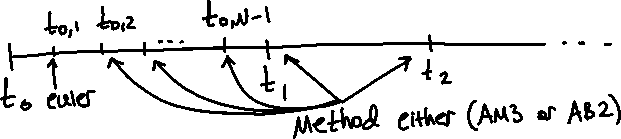
**EXACT SOLUTION**

**RESULTS**



Above are results for AB2 and AM3 methods. Some terminology below:

* \_SPECL suffix indicates that x1 was found using the given method for N subintervals between to find . Forward Euler was used to find where is the sub-term in the super-interval. Whichever method was being used for the super-intervals was used for all sub-intervals after was found.



* \_TRAP suffix indicates that trapezoidal method was used to find
* \_EULR suffix mean was found with forward Euler method

Each legend label comes with an order for each method. AB2\_TRAP and AB2\_SPECL are on top of each other.

**OBSERVATIONS**

The order of each method was determined in the decade

Immediately I noticed the unpredictable behavior of that of AM3 compared to AB2 methods. This agrees with what was discussed in class, that although higher order methods may have fast convergence initially, their error does not converge with increasing N but is instead unstable. This instability does not seem to be caused by computational limitations, because other methods are stable where AM3 is not. I can conclude with a reasonable degree of certainty that this instability is inherent to the AM3 method. It may behave differently for other differential equations.

As the error of the 3rd order method appears to be surpassing that of the 2nd order methods. AM3 does not appear to have a predictable bound on its error as increases.

Each method has an order which matched what was expected but AM2 method curves were shifted up and down depending on the method used to obtain .