**Q1**

It’s hard to figure it out exactly from just the plot of error. We can tell that it is probably along the lines of for some . We can infer this by eyeballing the slope of the graph. The slope looks like it is roughly between 1 and 2 (paying attention to the quirk that the axis aren’t drawn to the same physical scale).

To get a more exact solution, I fit a straight line through the 4 points. As it turns out, np.polyfit tells me that the slope is 1.424. Since we have only 4 data points, I take only 2 significant digits. I have included a plot of too.

As we can see, they have similar slopes.

**Q2**

First, we notice that with CFL=0.7, the solution at is pretty good. However, with CFL=0.75, the solution is terrible. As can be (kind of) seen, CFL=0.75 produces a solution that oscillates wildly at low .

The instability is from the AB3 iteration. Hence, we can conclude that the method is stable for a maximum CFL which is somewhere in between 0.7 and 0.75. Equivalents, since and , we know that the maximum allowable is in the range

What we can conclude is that must fall outside of the stability range. A quick look at the eigen values of tells us that the largest eigenvalue is 2i.