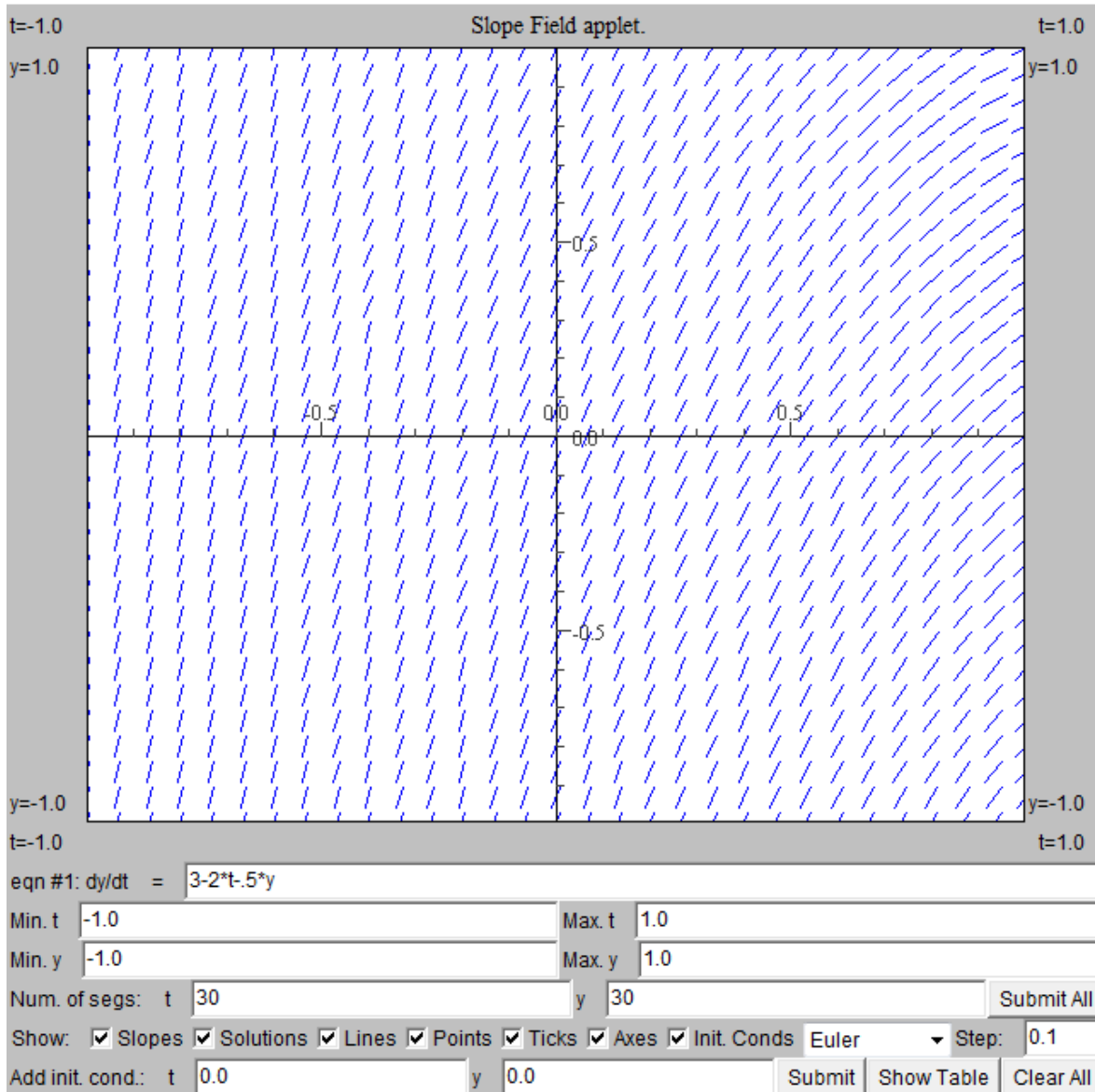


How to use JODE for Euler's method using Example 1 from slides

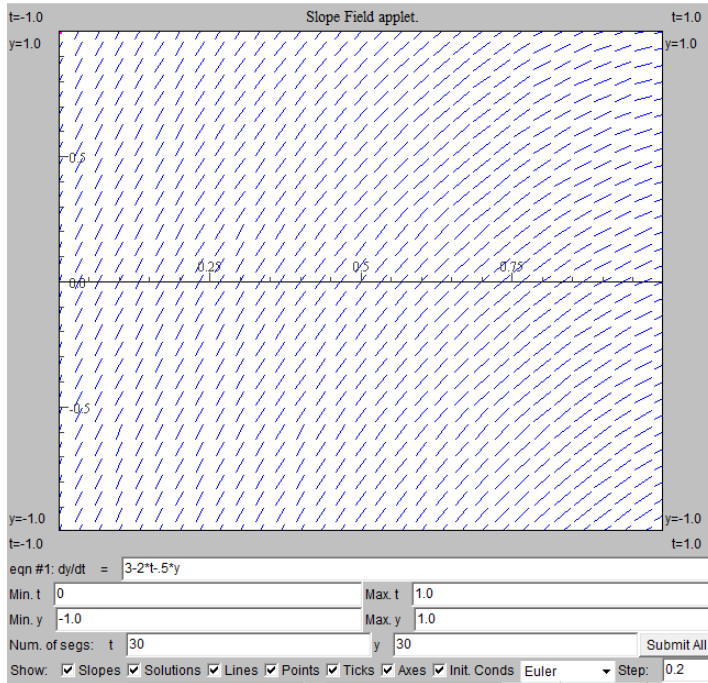
1. Go to <http://www.math.rutgers.edu/~sontag/JODE/>
2. Click on the 2nd ("same as above") link since our independent variable is t.
3. Change the "num of segs" to 30 and 30 to provide a bit more detail in the field lines.
4. Put in the ODE. Make sure to use * for multiplication: $3-2*t-.5*y$ and press enter (return).



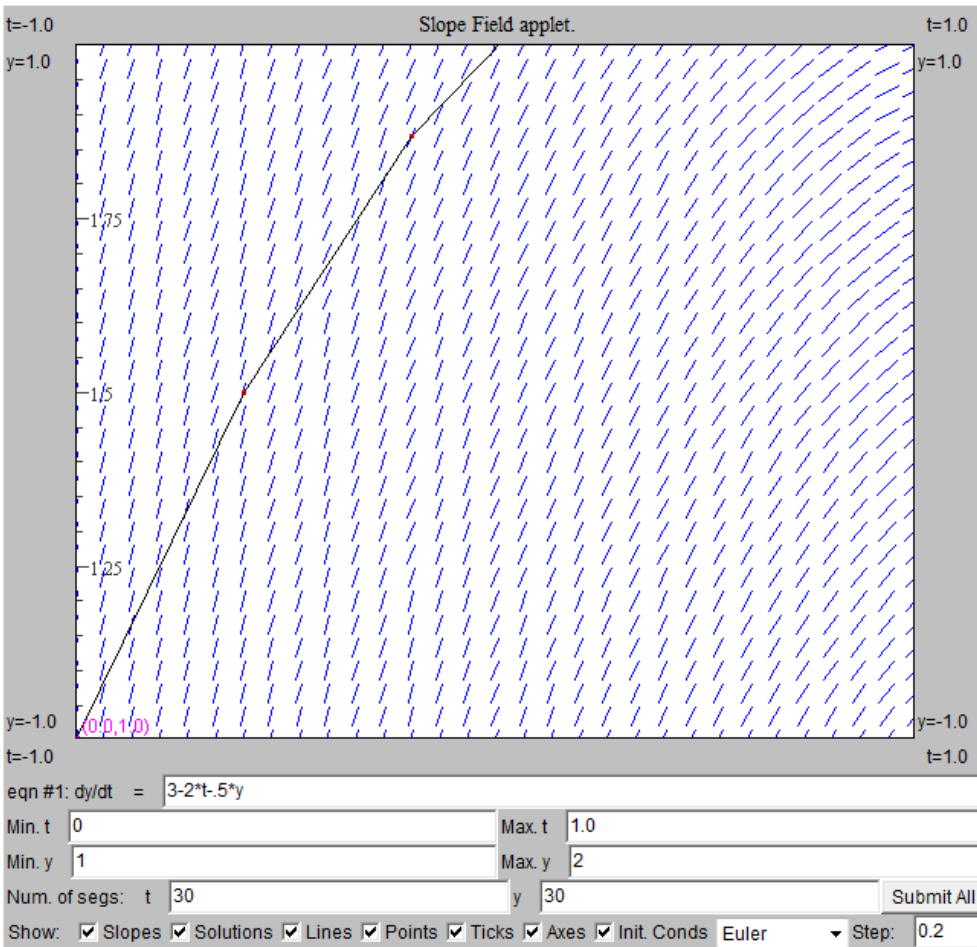
5. Since our initial value is $t=0$, change the "min t" to 0. Leave the "max t" at 1, since $t=1$ is our last t-value. (Leave the min and max y-values as is until we get our table.)
6. Leave the method at "Euler" and change the step to ".2"
7. Leave the initial t at 0 and change the initial y to 1. Hit "submit" and "show table".

Numerical solution, algorithm: Euler

i	t[i]	y[i]
0	0.000000	1.000000
1	0.200000	1.500000
2	0.400000	1.870000



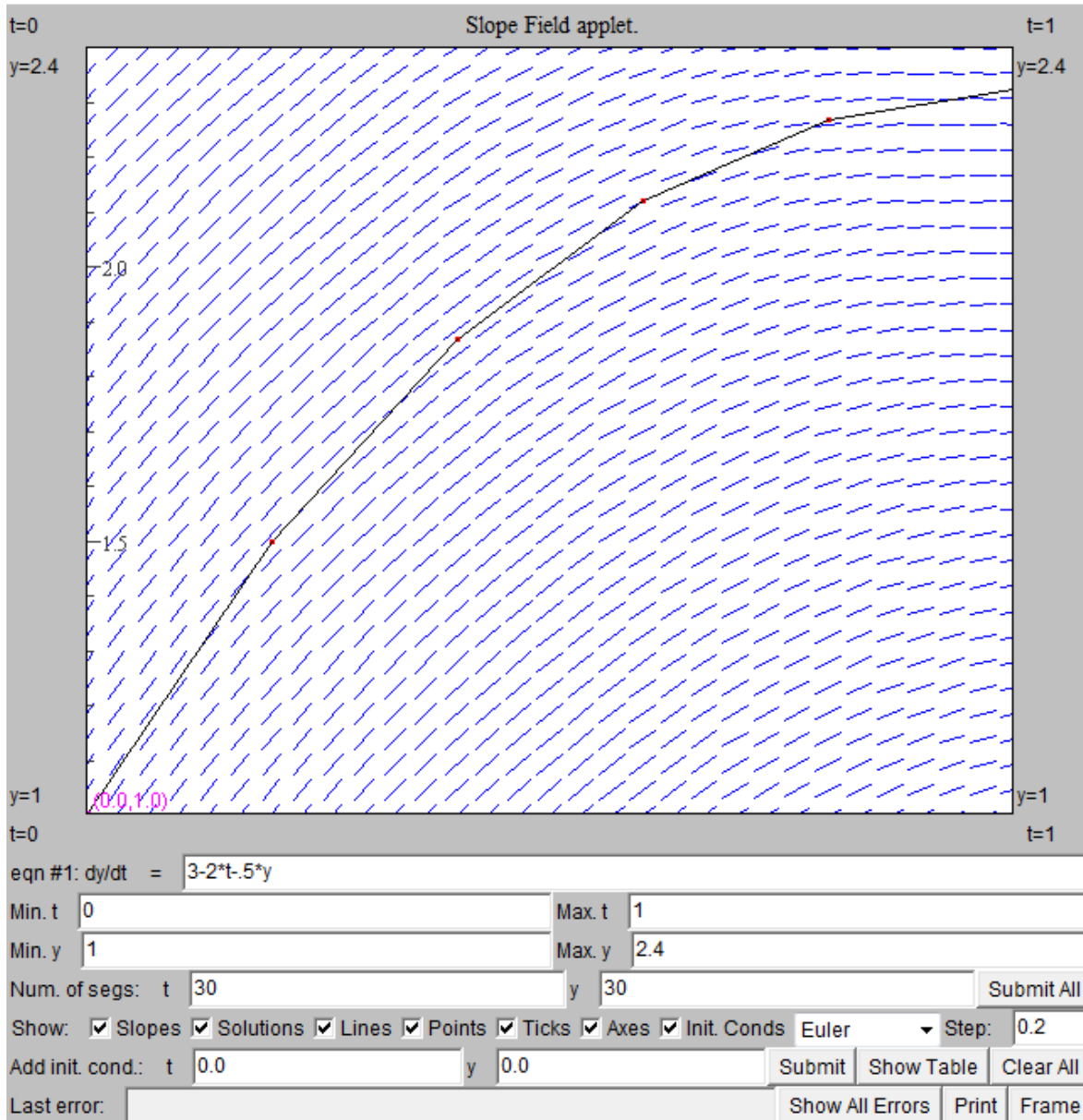
8. Since the y -values are not in our window, the table does not complete properly and the graph does not appear. Let's look at our IVP a little more closely. $y(0)=1$ and the initial derivative is 3, so our line is going up. Adjust the min and max values to say 1 and 2, put the initial conditions in again and hit "submit". This time the table does complete. Our solution appears but again goes out of the window.



Numerical solution, algorithm: Euler

i	$t[i]$	$y[i]$
0	0.000000	1.000000
1	0.200000	1.500000
2	0.400000	1.870000
3	0.600000	2.123000
4	0.800000	2.270700
5	1.000000	2.323630

9. Looking at the table, we see that at $t=1$, y is about 2.3, so change the max y to 2.4. Put in the initial conditions once again and hit “submit”. Here is the final graph:



Notes:

- If you make a mistake, one important “escape” route is that you can click “clear all”, which does **not** reset all the field entries. Instead, it just clears the graphs of any solutions and as well as anything in the table window.
- Finally, this software does not have the ability to selectively display values in the table. So to do your homework, you need to copy paste into another application, say Excel, where you can use the “lookup” function to extract the desired values or just copy paste the desired values one at a time.