Pre-class Warm-up!!!

In Section 2.3 I did not go over the following question, which starts:

Page 101 question 9
A motor boat weighs 32,000 lb and its motor provides a thrust of 5000lb. Assume that the water resistance is 100 pounds for each foot per second of the speed v of the boat. Then

$1000\, dv/dt = 5000 - 100\, v$

Then a question is asked about the motor boat.

Do you or your neighbor understand why the number 32,000 does not appear in this equation?

a. Yes

b. No

Or Does your neighbor understand where the 1000 comes from in this equation?

In fps units 1 lb is a unit of force
In mks units 1 kg is a unit of mass
In fps units 1 slug is accelerated at 1 ft/sec^2 by a 1 lb force
1 slug of strawberries = 32 "pounds" of ~~strawberries~~

Section 2.4: Euler's method

We learn:

- What it is and how to do calculations
- What 'step size' is.
- We don't need to know about: other terminology, errors. like rounding error etc.

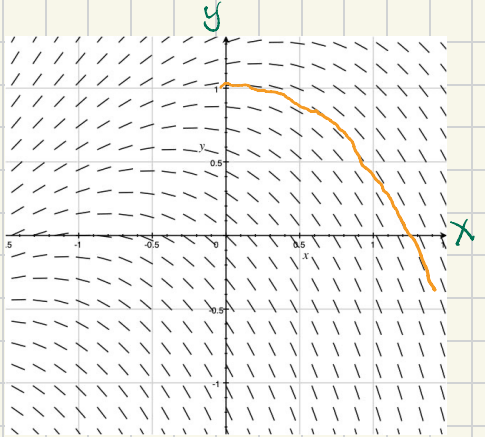
Page 114 question 5.
Apply Euler's method twice to approximate
$y' = y - x - 1$, $y(0) = 1$
on the interval [0,1/2], first with step size
$h = 0.25$, then with step size $h = 0.1$

The actual solution is $y = 2 + x - e^x$.

Let $h = x_n - x_{n-1}$

$y_n \approx hf(x_{n-1}, y_{n-1}) + y_{n-1}$ ← $= F(x_{n-1}, y_{n-1})$

Slope field of
$y' = y - x - 1$

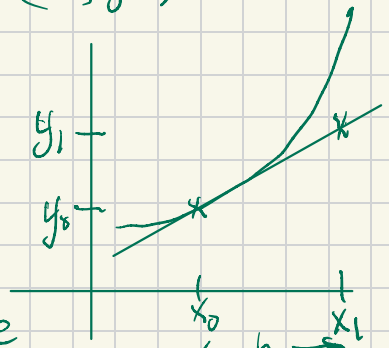


Write
$y' = f(x, y)$

The idea:

We start with a point (x_0, y_0) on the solution curve

Take an increment = step size h



Put $\frac{y_n - y_{n-1}}{x_n - x_{n-1}}$ = slope at x_{n-1}

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x	y	y'=f(x,y)	$\Delta = y_n - y_{n-1} = hf(x_{n-1}, y_{n-1})$
0	1	0	0
0.25	1 = lasty + Δ	-0.25	$-\frac{1}{16}$
0.5	$\frac{15}{16}$		

$h = 0.1$

x	y	y'=f(x,y)	Δ	True value
0	1	0	0	1
0.1	1	-0.1	-0.01	0.9948
0.2		-0.21	-0.021	0.9786
0.3	0.969	-0.331	-0.0331	0.9501
0.4	.9359	-0.4641	-0.04641	0.908
0.5	0.8895			0.8513

What is the computed value of y at x = 0.2?
a. 0.9
b. 0.99 ✓
c. 0.85
d. -0.21 e. None of the above.