Math 131 Midterm 2

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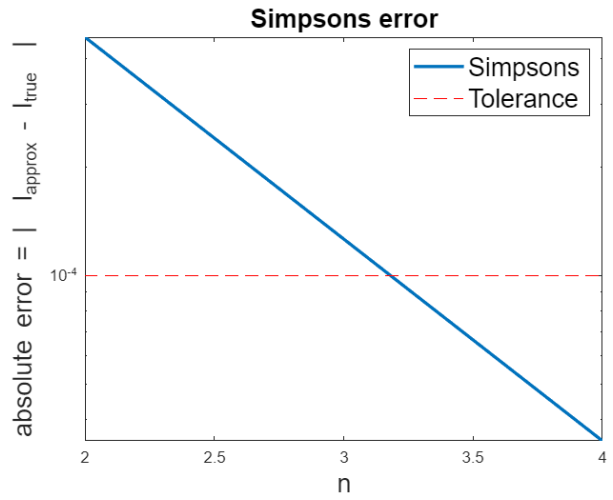
1.

a.

```
f = @(x) log(2. * x);
a = 1;
b = 2;
true_Solution = (4 * log(4) - 2 * log(2) - 2) / 2;

Tol = 10^(-4);
n = 1;
err_abs_simp = Inf;
n_vals_simp = [];
itr = 0;
while err_abs_simp > Tol
    itr = itr + 1;
    n = n*2;
    n_vals_simp(itr) = n;
    I = Simpson(f, a, b, n);
    err_abs_simp(itr) = abs(true_Solution - I);
end
```

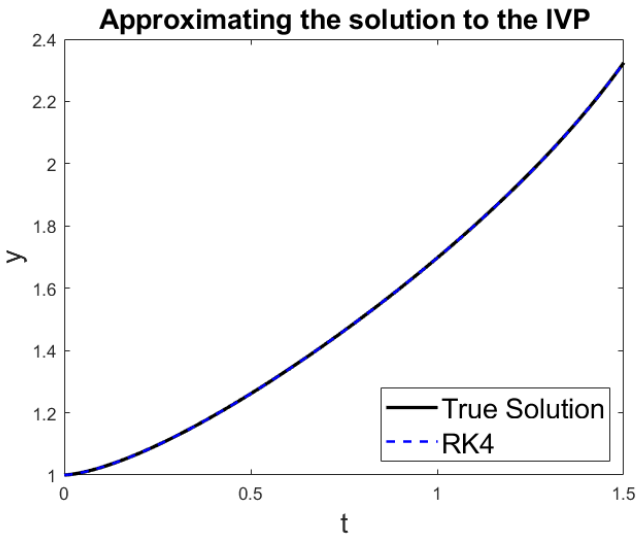
b.



The above plot shows the absolute errors for composite Simpsons

2.

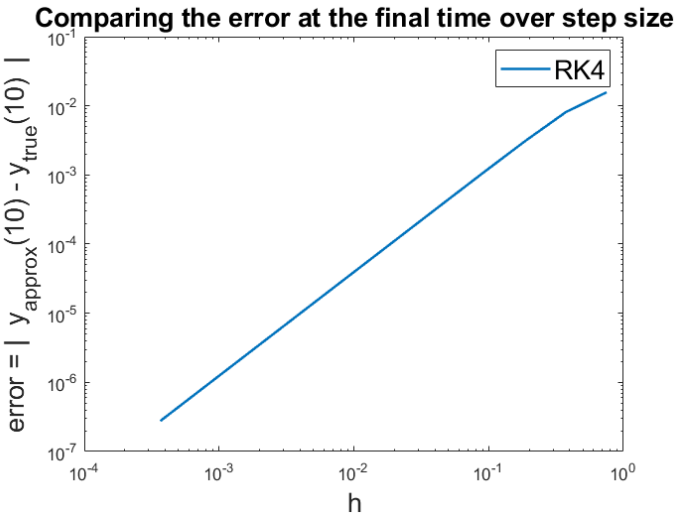
a.

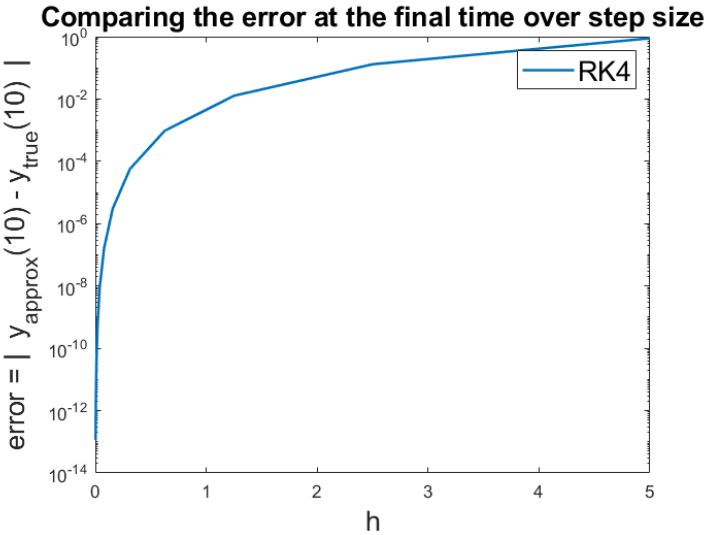


The above figure shows the numerical solutions from rk4 overlap with the true solution in black.

To the eye, both solvers are working well.

b.





The above figure shows the errors at the final time over decreasing h for rk4.

figure One is loglog plot and figure two is a semilogy plot