# Output:

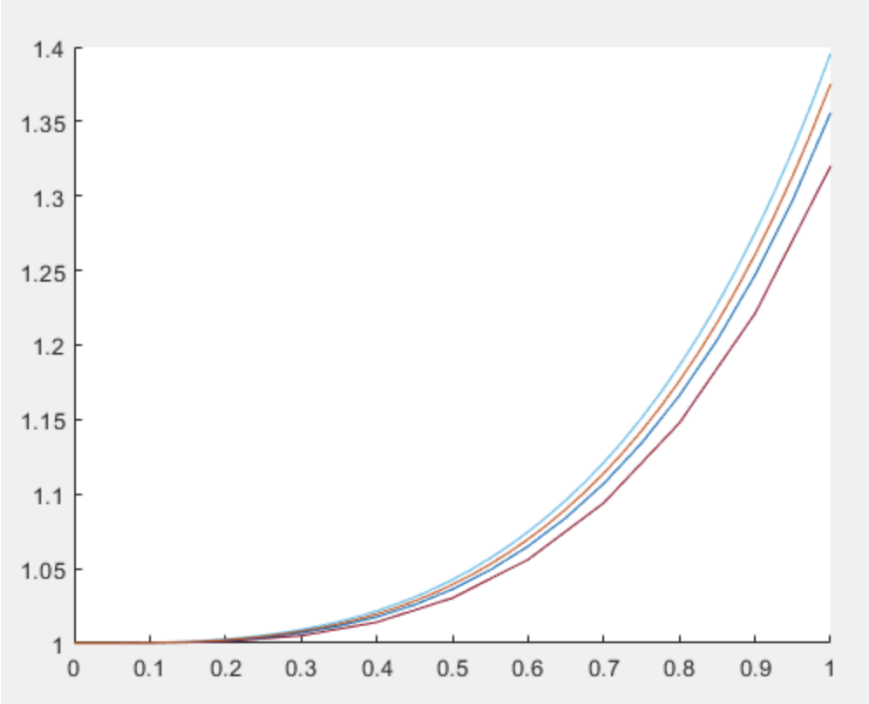
## Section 6.1 Computer Problems:

Problem 1b:

Table of Euler's Method with step size h = 0.1 on [0, 1] for the IVP y' = t^2 * y, y(0) = 1

| ti | wi | Error |
|---|---|---|
| 0 | 1 | 0 |
| 0.1 | 1 | 0.0003 |
| 0.2 | 1.001 | 0.0017 |
| 0.3 | 1.005 | 0.004 |
| 0.4 | 1.014 | 0.0075 |
| 0.5 | 1.0303 | 0.0123 |
| 0.6 | 1.056 | 0.0186 |
| 0.7 | 1.094 | 0.0271 |
| 0.8 | 1.1477 | 0.0384 |
| 0.9 | 1.2211 | 0.054 |
| 1 | 1.32 | 0.0756 |

Problem 2b:




The turquoise line represents the exact solution for the IVP y' = t^2 * y, y(0) = 1 on [0, 1].
The orange line represents an Euler's Method approximation of the IVP with step size h = 0.025.
The blue line represents an Euler's Method approximation of the IVP with step size h = 0.05.
The red line represents an Euler's Method approximation of the IVP with step size h = 0.1

## Section 6.2 Computer Problems:

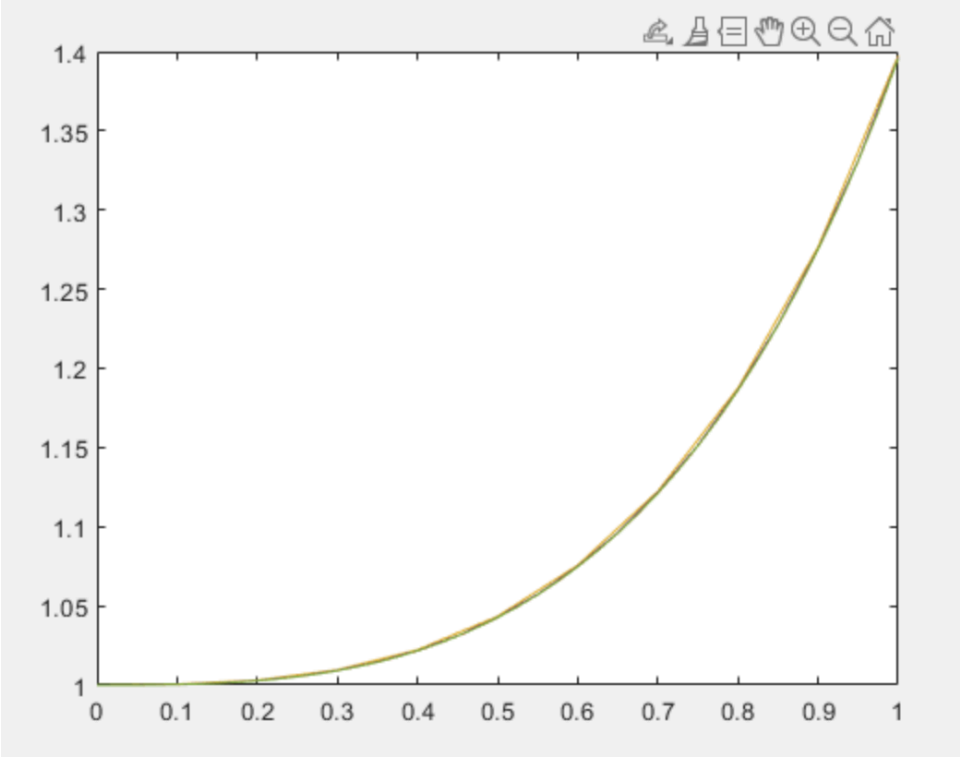
Problem 1b:

Table of Explicit Trapezoid Method with step size h = 0.1 on [0, 1] for the IVP y' = t^2 * y, y(0) = 1

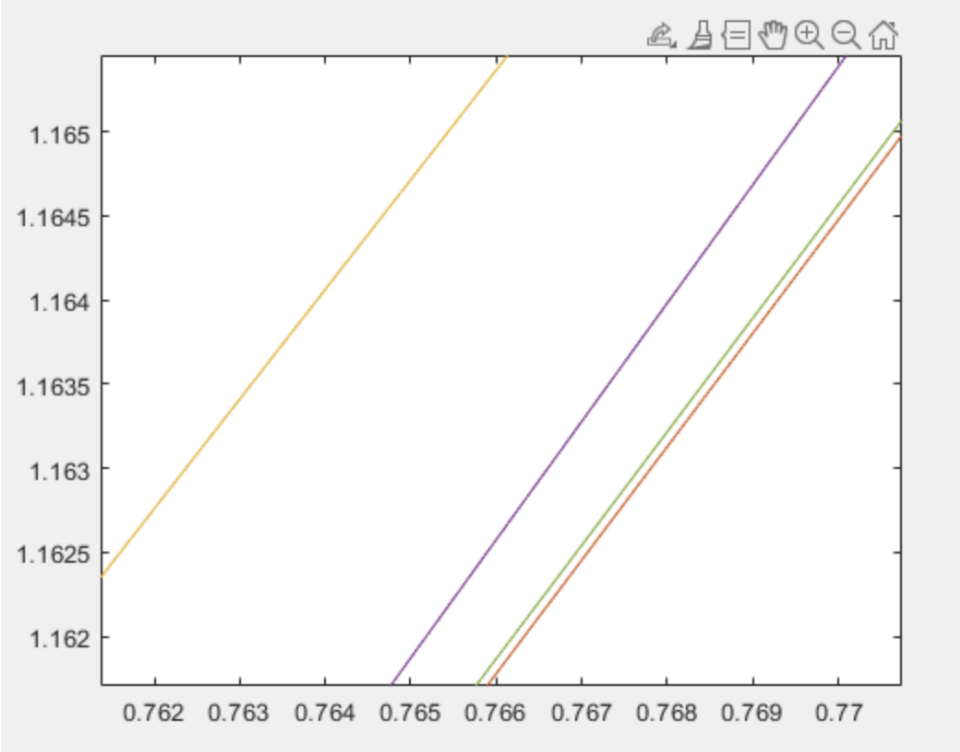
| ti | wi | Global Truncation Error |
|---|---|---|
| 0 | 1 | 0 |
| 0.1 | 1.0005 | 0.0002 |
| 0.2 | 1.003 | 0.0003 |
| 0.3 | 1.0095 | 0.0005 |
| 0.4 | 1.0222 | 0.0007 |
| 0.5 | 1.0434 | 0.0008 |
| 0.6 | 1.0757 | 0.001 |
| 0.7 | 1.1224 | 0.0012 |
| 0.8 | 1.1875 | 0.0014 |

| | | |
|---|---|---|
| 0.9 | 1.2767 | 0.0016 |
| 1 | 1.3974 | 0.0018 |

Problem 2b:



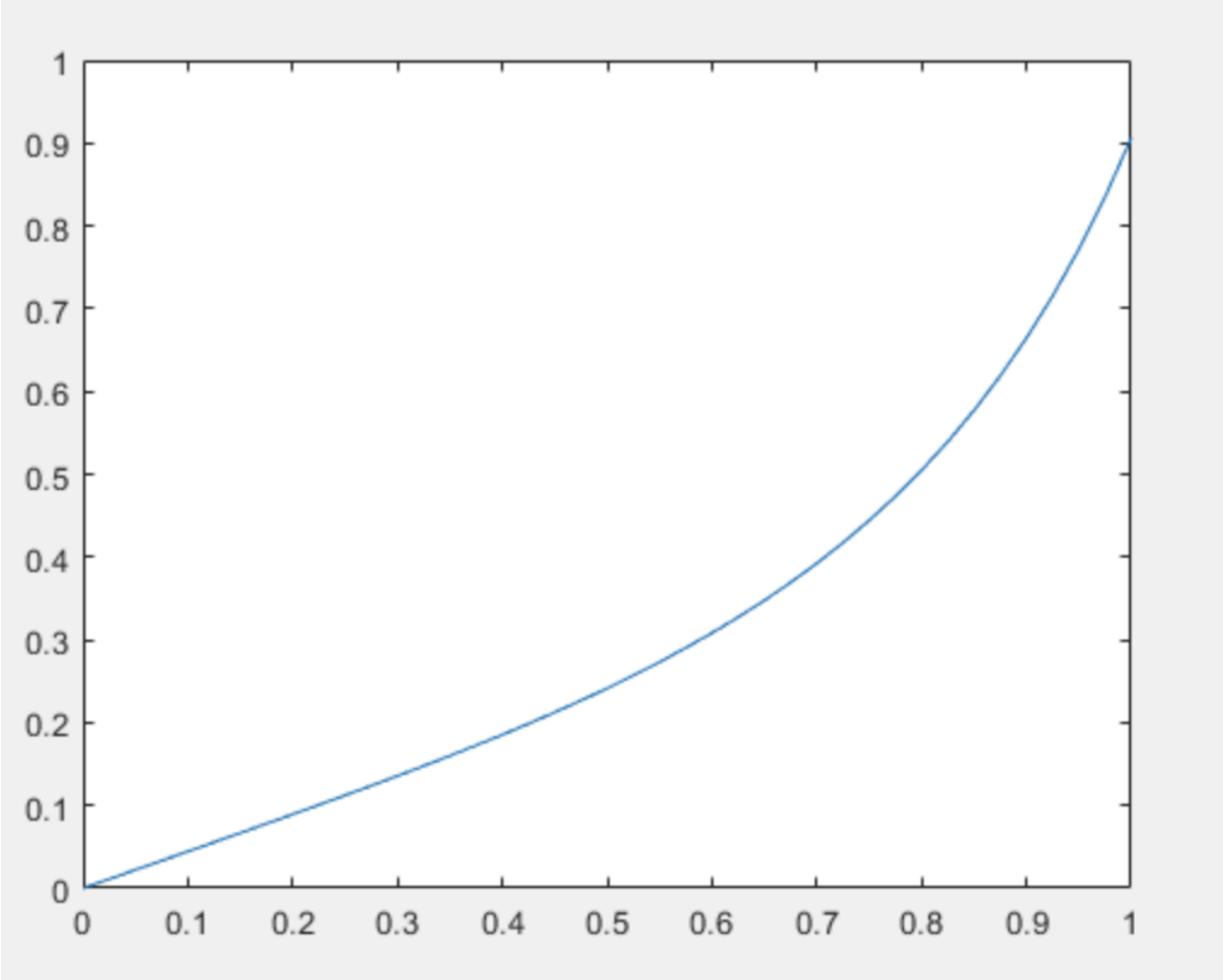

Zoomed in to better see the exact and approximate solutions:




The orange line represents the exact solution for the IVP y' = t^2 * y, y(0) = 1 on [0, 1].
The green line represents an Explicit Trapezoid Method approximation of the IVP with step size h = 0.025.
The purple line represents an Explicit Trapezoid Method approximation of the IVP with step size h = 0.05.
The yellow line represents an Explicit Trapezoid Method approximation of the IVP with step size h = 0.1.

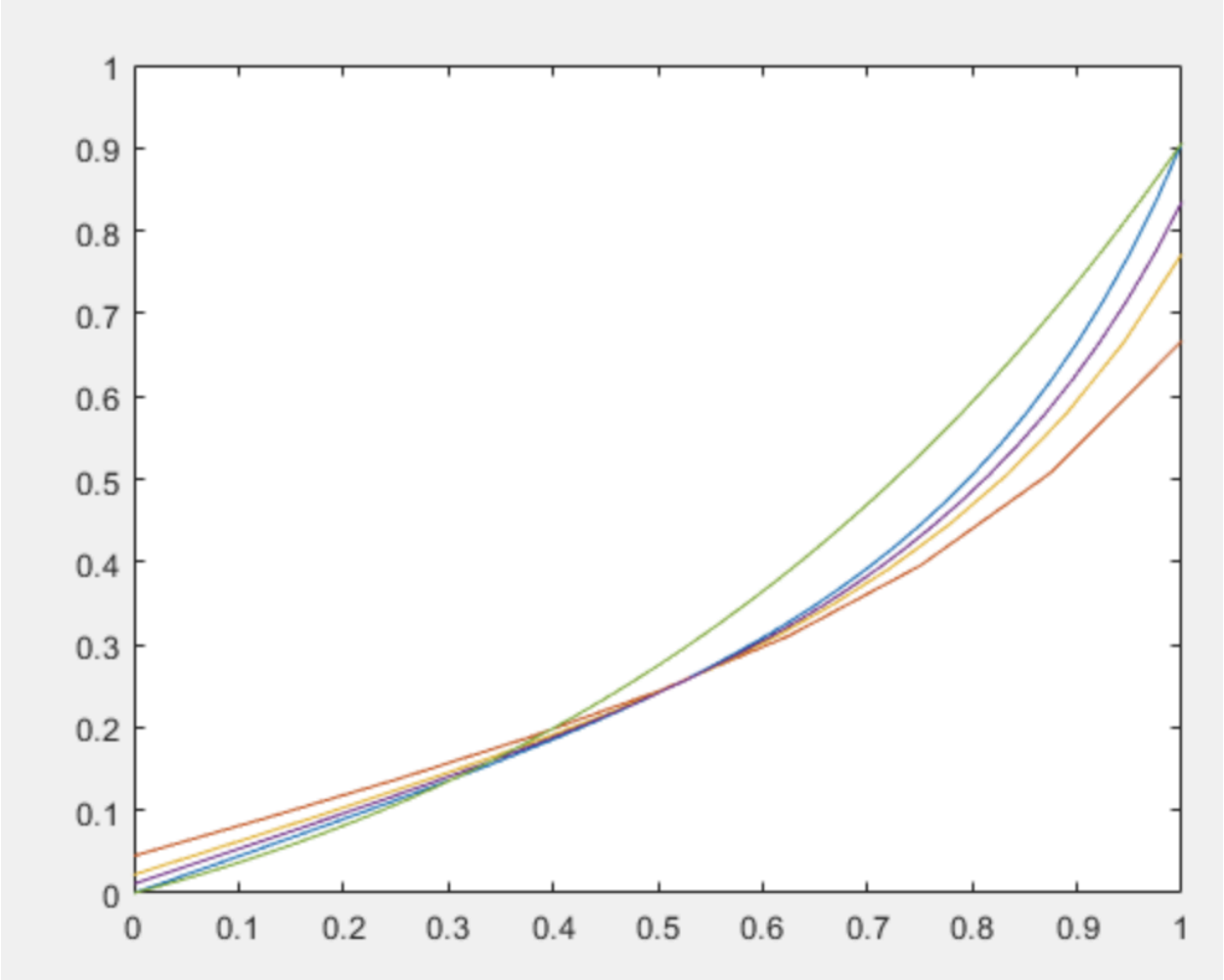
## Section 7.1 Computer Problems:

Problem 1a:



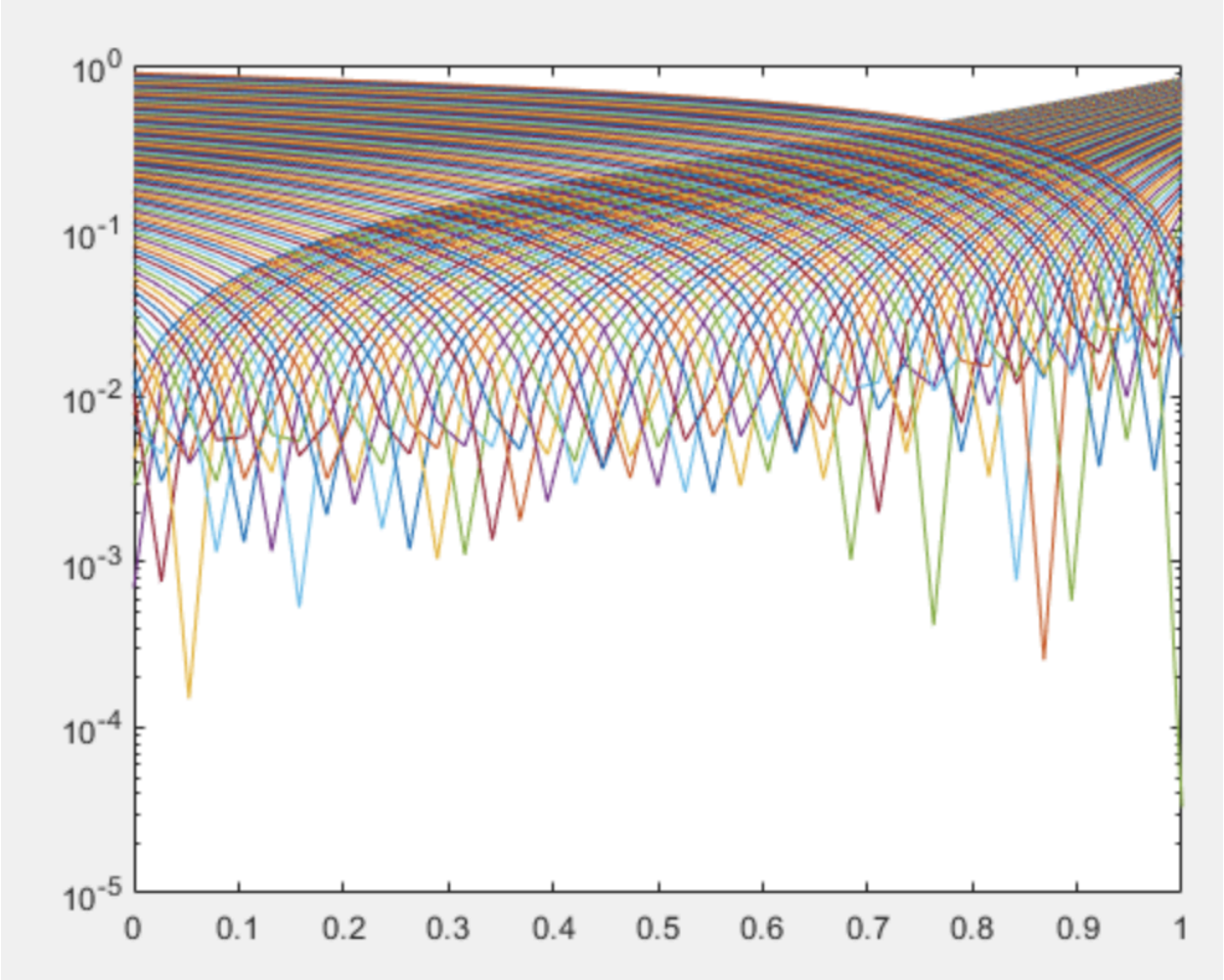

## Section 7.2 Computer Problems:

Problem 1a:




The green line represents the exact solution for the BVP y'' = y + (2/3)e^t, y(0) = 0, y(1) = (1/3)e
The dark orange line represents a finite difference approximation of the BVP with n = 9 steps.
The yellow line represents a finite difference approximation of the BVP with n = 19 steps.
The purple line represents a finite difference approximation of the BVP with n = 39 steps.

Note: Ignore the blue line, I am dealing with a problem with MATLAB and/or Citrix that is showing an unrelated function.




Note: This graph is supposedly representing the errors as a function of t for the same BVP based on the three previously described finite difference method approximations.