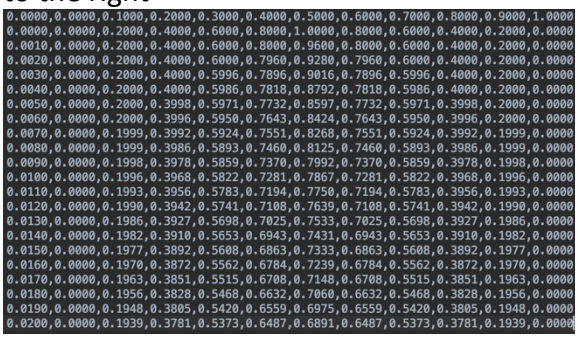
Michael Einreinhof

Homework Submission Template 8

Problem 1)

Screenshot of text file or comma delimitated file with times in left column and rod profile values to the right



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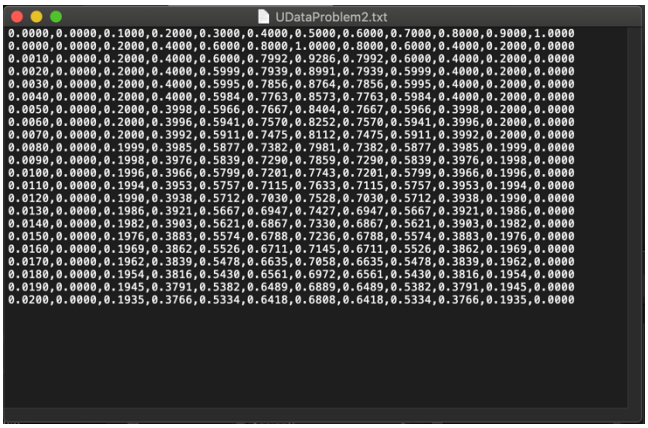
```

Problem 2)

Why don't you need to include boundary conditions or initial conditions in the analytical solution?
The analytical solution is to calculate at any point of the rod and the time, dependent of other spots on the rod. So it will calculate the values at the initial condition at the beginning.

Screenshot of text file or comma delimitated file with times in left column and rod profile values to the right



UDataProblem2.txt

```
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```

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Problem 3)

Case 1

Time	Fine - Difference x=0.5	Analytical Solution x=0.5	Difference	Percent Error
0.005	0.8597	0.8404	0.0193	2.30%
0.01	0.7867	0.7743	0.0124	1.60%
0.015	0.7333	0.7236	0.0097	1.34%
0.02	0.6891	0.6808	0.0083	1.22%

Case 2

Time	Fine - Difference x=0.5	Analytical Solution x=0.5	Difference	Percent Error
0.005	0.96	0.8404	0.1196	14.23%
0.01	0.928	0.7743	0.1537	19.85%
0.015	0.9016	0.7236	0.178	24.60%
0.02	0.8792	0.6808	0.1984	29.14%

Case 3

Time	Fine – Difference x=0.5	Analytical Solution x=0.5	Difference	Percent Error
0.01	0.96	0.7743	0.1857	23.98%
0.02	0.928	0.6808	0.2472	36.31%

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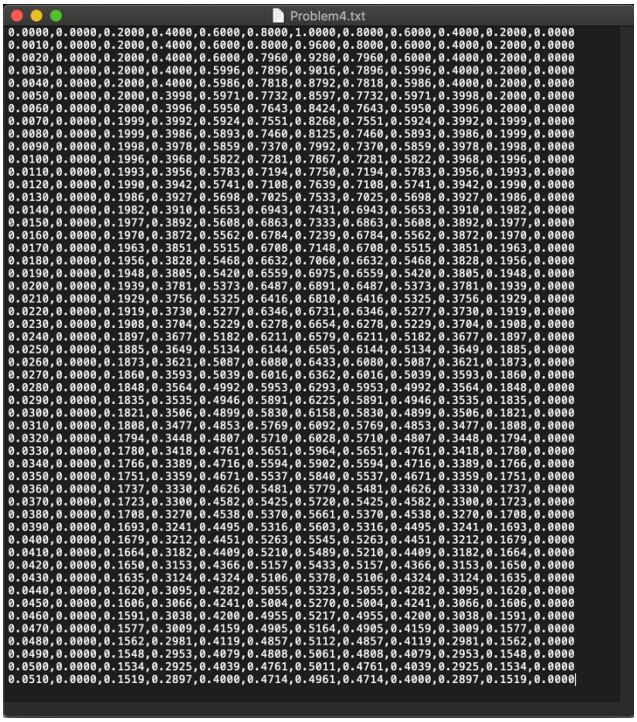
Problem 4)
How long did it take for the center value of the rod to reach a value less than 0.5 units?
.051s

Screen shot of opened data file



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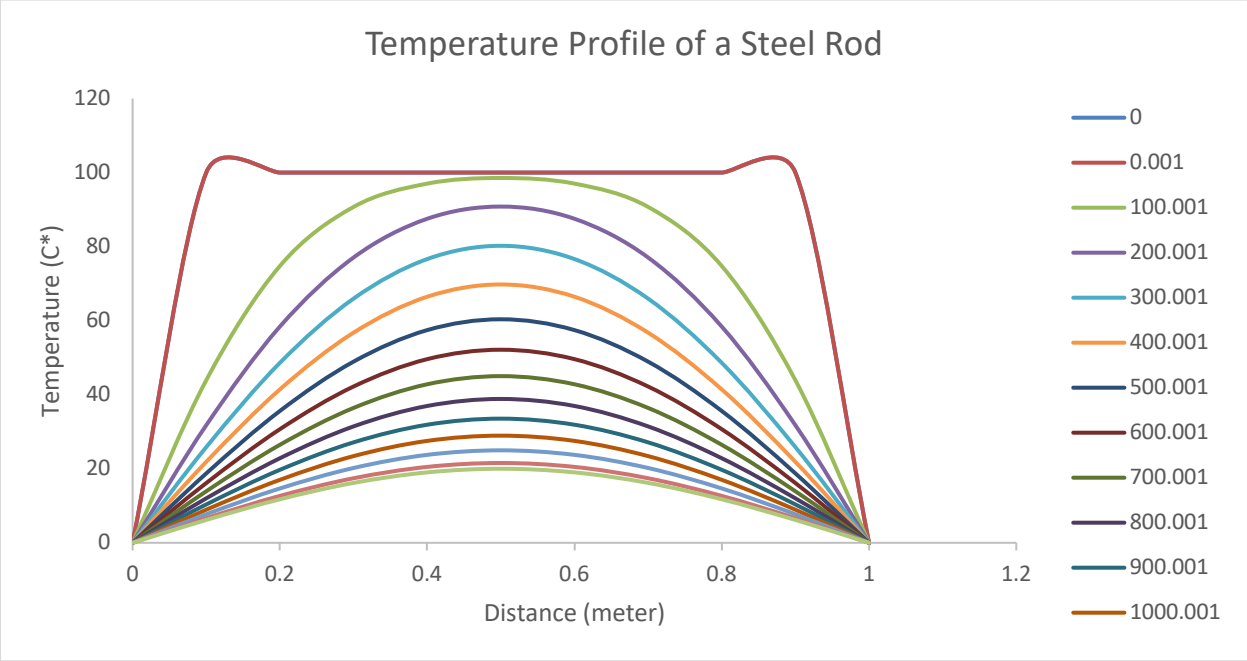
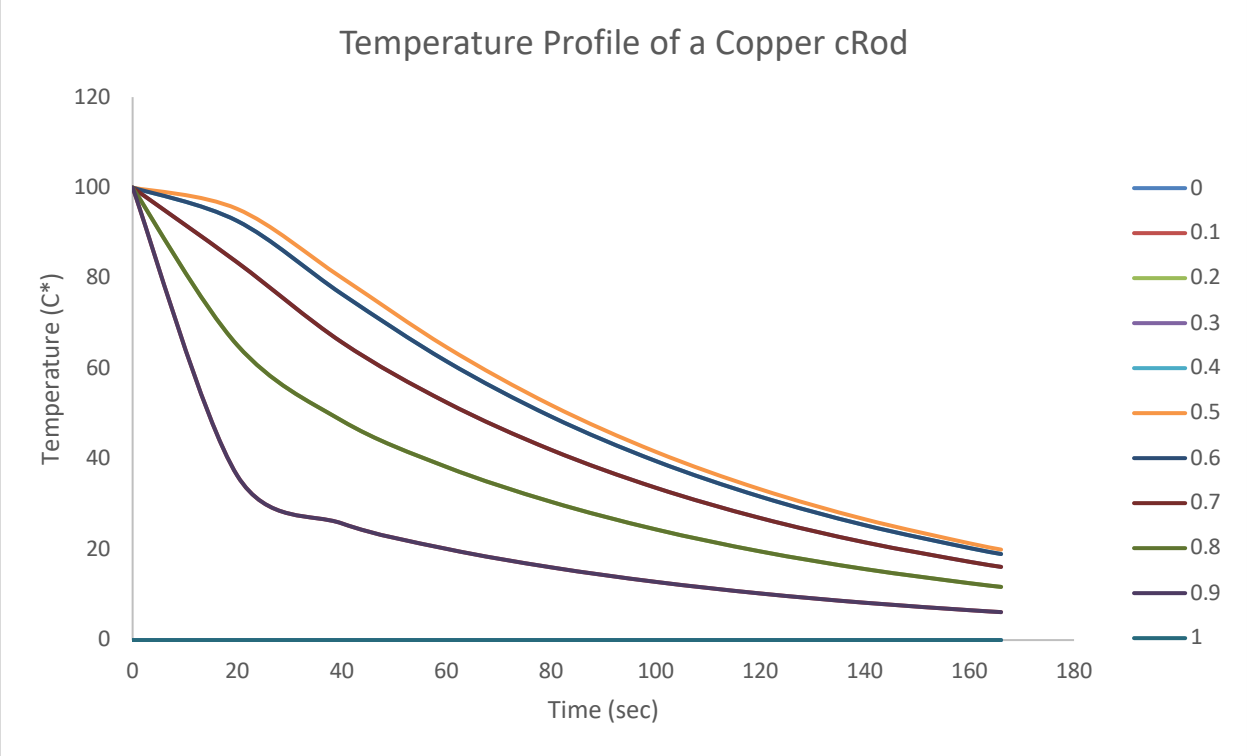
Problem 5)
Plot of steel



Plot for Copper



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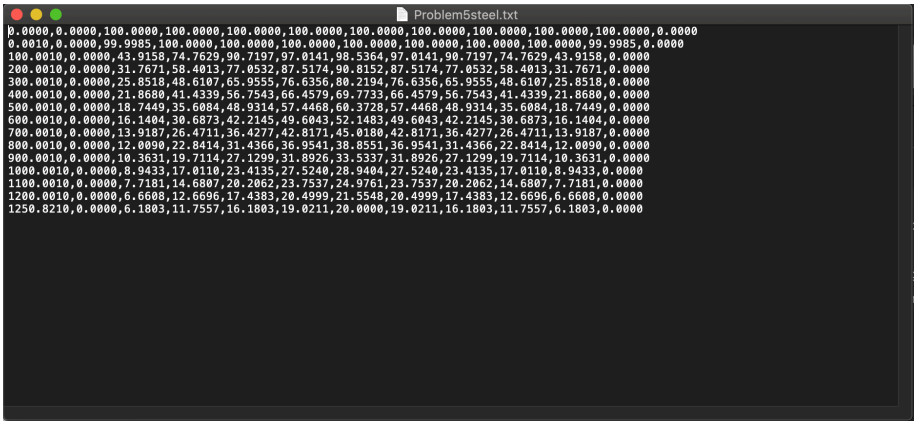
What time step values are the maximum you can use and still maintain stability for steel?
33.223s

What time step values are the maximum you can use and still maintain stability for copper?
4.4109s

Screen shot of opened file for steel



Screen shot of opened file for copper