5.1.4 Exam: Identify error behavior for a numerical method

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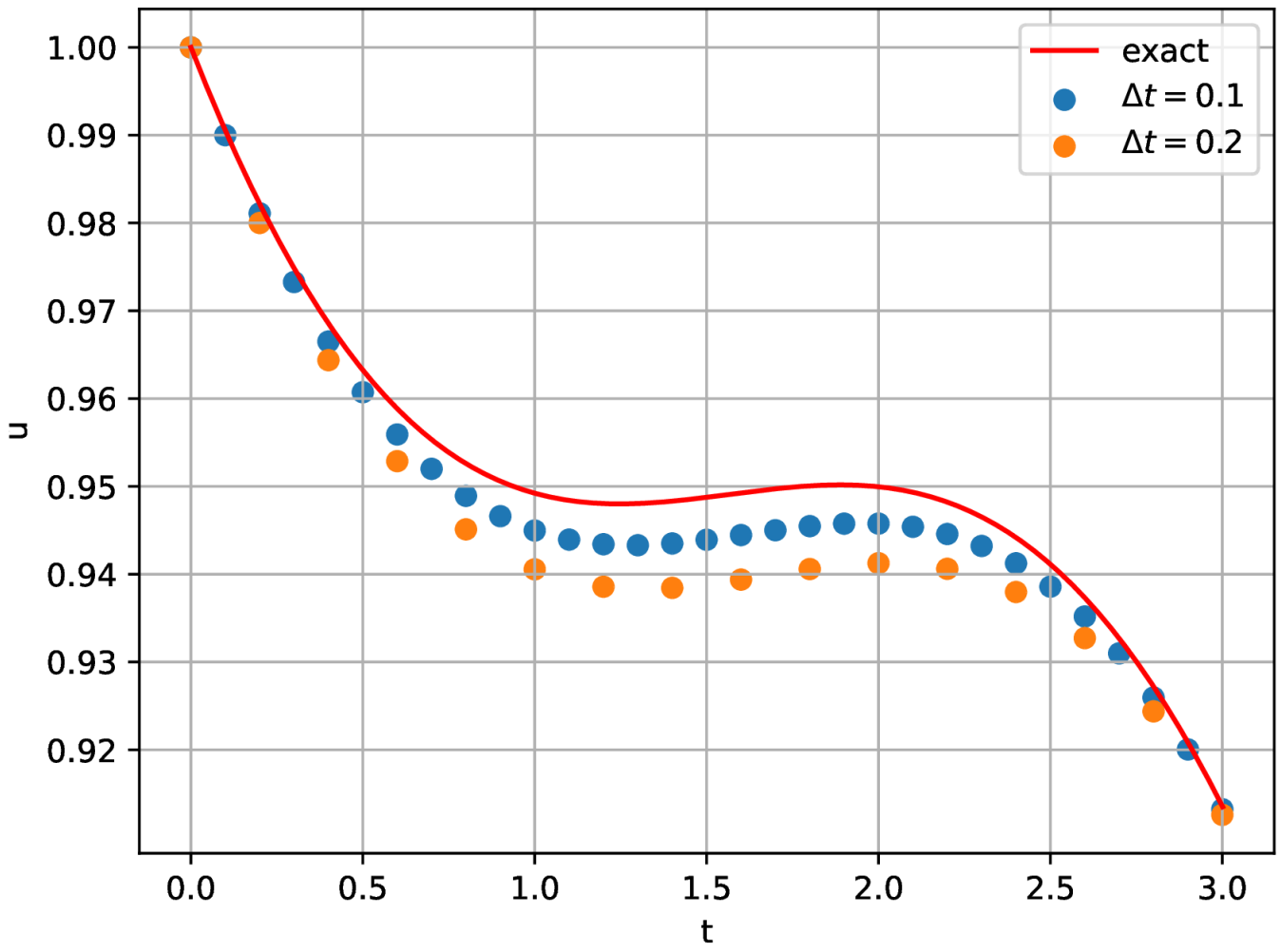
Exams due Aug 30, 2023 05:00 IST Completed

A numerical method is used to solve an Initial Value Problem for the state $u\,(t)$ using timesteps of $\Delta t = 0.1$ and 0.2. The results from the numerical method as well as the exact solution are shown in the plot below.



Problem: Error at t=2.4 with coarser timestep

1/1 point (graded)

Select the value which approximates the magnitude of the error at $t = 2.4$ for $\Delta t = 0.2$ in the above plot?

- 0.003
- 0.006
- 0.938
- 0.941
- 0.944

✔

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Answers are displayed within the problem

Problem: Error at t=2.4 with finer timestep

1/1 point (graded)

Select the value which approximates the magnitude of the error at $t = 2.4$ for $\Delta t = 0.1$ in the above plot?

- (●) 0.003
- ( ) 0.006
- ( ) 0.938
- ( ) 0.941
- ( ) 0.944

✔

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Problem: When is the error largest for coarser timestep

1/1 point (graded)

For the coarser timestep ($\Delta t = 0.2$), which of the following times has the largest error magnitude? Note: these times may not include the time at which the maximum error occurs for this timestep. Just identify the time *among those listed* that has the largest error.

- ( ) t=0.6
- (●) t=1.0
- ( ) t=2.4

✔

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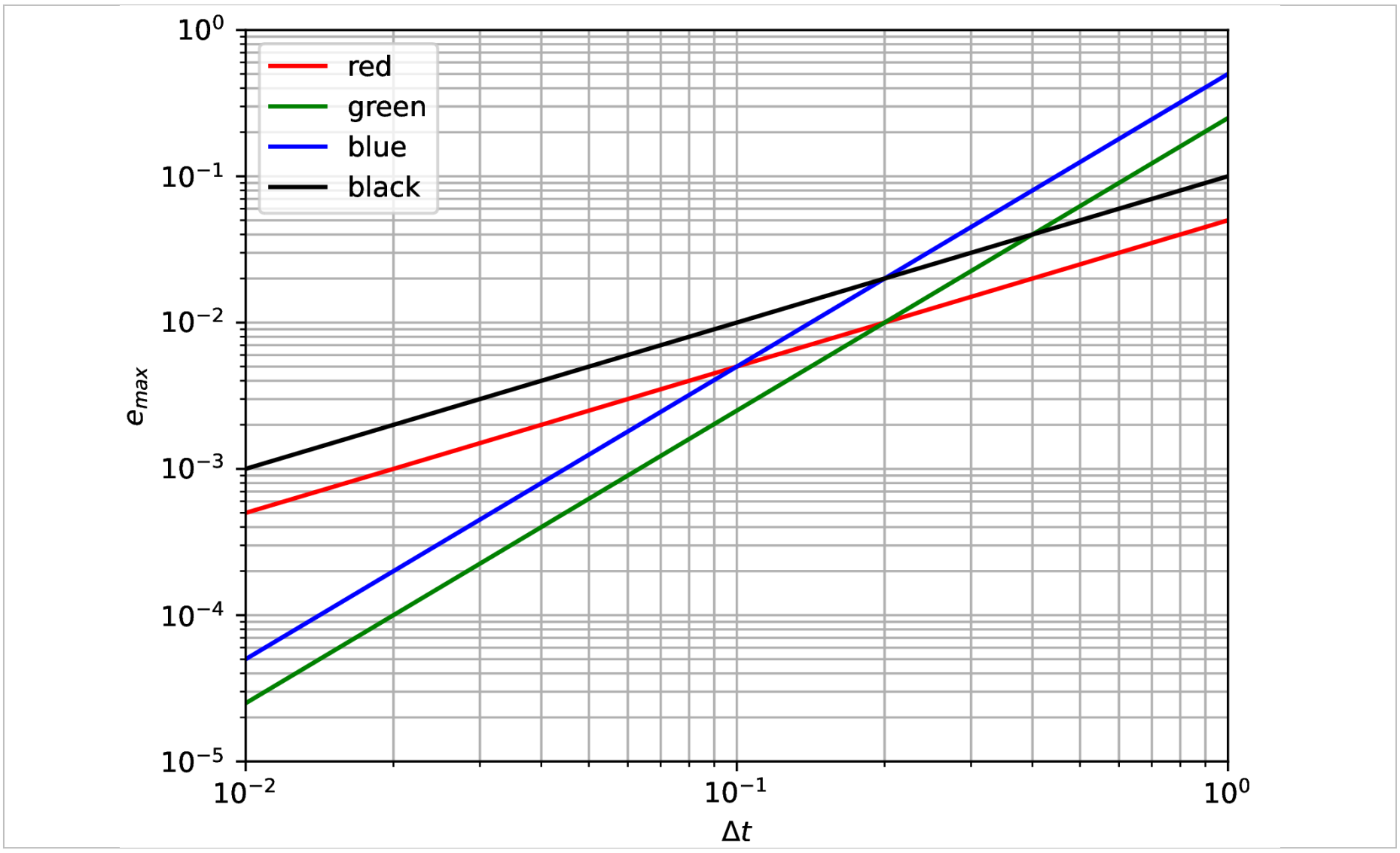
Problem: Find the correct convergence plot

2.0/2.0 points (graded)

Which line on the plot of $e_{\max}$ (i.e. the maximum error magnitude for over all time) versus Δt below is consistent with the results from the numerical method.

- (●) red
- ( ) green
- ( ) blue
- ( ) black
- ( ) None of the above



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