



## Nonlinear Dynamics: Mathematical and Computational Approaches

Lead instructor: [Liz Bradley](#)

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[✓ 6.1 ODE solvers, round II: Error and adaptation » Quiz](#)
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- You may come back to quizzes and take them as many times as you like
- When you are finished, clicking the "Score" button at the bottom of the test will show you the correct responses.

### Question 1

The local truncation error of the forward Euler method is...

(a)

Proportional to the step size

- ✗ ☐ A. True  
☒ B. False

(b)

Independent of the dynamical landscape

- ✗ ☐ A. True  
☒ B. False

(c)

Equal to  $\frac{1}{2}(\Delta x)^2 f'(x)$

- ☐ A. True  
☒ B. False

(d)

Equal to  $\frac{1}{2}(\Delta x)^2 f''(x)$

- ✓ ☒ A. True  
☐ B. False

(e)

Equal to  $\frac{1}{2}(\Delta x)^2 f'''(x)$

- ☐ A. True  
☒ B. False

### Question 2

Finite-precision arithmetic causes truncation error.

- ☐ A. True  
☒ B. False

### Question 3

Finite-precision arithmetic causes roundoff error.

- ✓ ☒ A. True

☐ B. False

**Question 4**

Observation error can "snowball" over the course of a numerical solution of an ODE.

☐ A. True

✓ ☒ B. False

**Question 5**

The trapezoidal ODE solver has lower error than...

☐ A. Forward Euler

☐ B. Backward Euler

✓ ☒ C. Both

☐ D. Neither

**Question 6**

Why is it a good idea to adapt the time step of an ODE solver on the fly?

☐ A. Because that reduces truncation error

✓ ☒ B. Because that handles the different curvatures that can occur in different parts of the dynamical landscapes in a nonlinear system

☐ C. Because it simplifies the code of the ODE solver

You got 8 out of 10 questions correct

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