

## Course outline

How does an NPTEL online course work?

## Assignment 0

## Lecture Material

## Week 1

## Week 2

- Lecture 8: Interactivity with Python - Ipywidgets
- Lecture 9: Geometric Interpretations of ODEs
- Lecture 10: Bifurcations: Saddle node bifurcation
- Lecture 11: Bifurcation: Transcritical bifurcation
- Lecture 12: Bifurcation: Pitchfork bifurcation
- lecture 13: Imperfect bifurcations and catastrophies

## Quiz : Assignment 2

- Feedback Form

## Week 3

## Week 4

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## Detailed Solution

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# Assignment 2

The due date for submitting this assignment has passed.

**Due on 2021-02-07, 23:59 IST.**

As per our records you have not submitted this assignment.

- 1) For an interactive plot in python a function needs to be previously defined. The statement is

**1 point**

- a. True  
 b. False

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 a. True

- 2) Which library is used to add an interactive slider to graphs in python?

**1 point**

- a. Notebook  
 b. ipywidgets  
 c. numpy  
 d. matplotlib

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 b. ipywidgets

- 3) The command for an interactive plot in python is given as `w = interactive(plot_sin, k=(0.1, 10, 0.05), r=(20, 200, 5))` the slider for variable k in the interactive plot will vary from \_\_\_\_\_ to \_\_\_\_\_ in steps of \_\_\_\_\_. **1 point**

- a. 20, 200, 5  
 b. 20, 200, 0.05  
 c. 0.1, 20, 5  
 d. 0.1, 10, 0.05

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 d. 0.1, 10, 0.05

- 4) In python which function is used to numerically integrate a system of ordinary differential equations given an initial value

**1 point**

- a. solve  
 b. fsolve  
 c. solve\_ivp  
 d. solve\_bvp

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 c. solve\_ivp

- 5) Which of the output of the command `sol = solve_ivp(lambda t, y: t-y, [0, 15], [2])` gives the times at which the solver found values? **1 point**

- a. sol.i  
 b. sol.t  
 c. sol.y  
 d. sol.v

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 b. sol.t

- 6) In python which function returns the roots of the (non-linear) equations defined by `func(x) = 0` given a starting estimate

**1 point**

- a. solve  
 b. fsolve  
 c. solve\_ivp  
 d. solve\_bvp

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 b. fsolve

- 7) Which function in python finds a zero of a real or complex function using the Newton-Raphson (or secant or Halley's) method. **1 point**

- a. bisect  
 b. ridder  
 c. newton  
 d. brentq

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 c. newton

- 8) For the command `sol = fsolve(f, [-2, 2], args=(r), full_output=True)`; what will be the output of `sol[2]` for a converged solution? **1 point**

- a. 0  
 b. 1  
 c. 2  
 d. 5

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 b. 1

- 9) In python, the number of elements of \_\_\_\_\_ will be the number of roots that fsolve has found. **1 point**

- a. sol[0]  
 b. sol[1]  
 c. sol[2]  
 d. sol[3]

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 a. sol[0]

- 10) What is the default method used in `solve_ivp()` function to solve an initial value problem for a system of ODEs in python? **1 point**

- a. RK23  
 b. RK45  
 c. Radau  
 d. BDF

No, the answer is incorrect.  
 Score: 0

Accepted Answers:  
 b. RK45