

Unit 5 - Week 3

Course outline
How does an NPTEL online course work?
MATLAB
Week 1
Week 2
Week 3
○ Order of Convergence of an Iterative Method
● Regula-Falsi and Secant Method for Solving Nonlinear Equations
○ Raphson method for solving nonlinear equations
● Newton-Raphson Method for Solving Nonlinear System of Equations
● Matlab Code for Fixed Point Iteration Method
● Feedback Form
○ Quiz : Assignment 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Assignment Solutions
Download Videos

Assignment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-10-07, 23:59 IST.

- 1) To find the root of $f(x) = 0$, a scientist is using the bisection method. At the beginning of an iteration the lower and upper guesses of the root are x_l and x_u . At the end of the iteration, the absolute relative approximation error in the estimated value of the root would be 1 point

- $\left| \frac{x_u}{x_u + x_l} \right|$
 $\left| \frac{x_l}{x_u + x_l} \right|$
 $\left| \frac{x_u - x_l}{x_u + x_l} \right|$
 $\left| \frac{x_u + x_l}{x_u + x_l} \right|$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\left| \frac{x_u - x_l}{x_u + x_l} \right|$$

- 2) Assuming an initial bracket of $[1, 5]$, the second iterative value of the root of $te^{-t} - 0.3 = 0$, using the bisection method is 1 point

- 0
 1.5
 2
 3

No, the answer is incorrect.

Score: 0

Accepted Answers:

2

- 3) The root of the equation $f(x) = 0$ is found by utilizing the Newton-Raphson method. The underlying initial guess of the root is $x_0 = 3$, $f(3) = 5$. The angle the line tangent to the function $f(x)$ makes at $x = 3$ is 57° w.r.t. the x -axis. The next estimate of the root, x_1 , must nearly be 1 point

- 3.2470
 -0.24704
 3.2470
 6.2470

No, the answer is incorrect.

Score: 0

Accepted Answers:

-0.24704

- 4) A bound for the number of iterations needed to achieve an approximation with accuracy 10^{-5} to the solution of $x^3 - x - 1 = 0$ lying in the interval $[1, 2]$ in Bisection method is 1 point

- 9
 11
 8
 14

No, the answer is incorrect.

Score: 0

Accepted Answers:

14

- 5) Let $g \in C[1, 2]$ and for any number p_0 in $[1, 2]$, the sequence defined by $p_n = g(p_{n-1})$, $n \geq 1$. Then for which g , the Fixed-Point theorem gives to guarantee the sequence p_n converges to the unique fixed point p in $[1, 2]$ 1 point

- $g(x) = x - x^3 - 4x^2 + 10$
 $g(x) = \frac{1}{2}(10 - x^3)^{1/2}$
 $g(x) = (10/(4 + x))^{1/2}$
 $g(x) = ((10/x) - 4x)^{1/2}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $g(x) = (10/(4 + x))^{1/2}$

- 6) The Newton-Raphson method of finding roots of nonlinear equations falls under the category of which method ? 1 point

- bracketing
 open
 random
 graphical

No, the answer is incorrect.

Score: 0

Accepted Answers:

open

- 7) For finding the root of $\cos x = 0$ by the Secant method, which of the following choice of initial guesses would not be appropriate 1 point

- $\pi/4$ and π
 $\pi/4$ and $3\pi/4$
 $-\pi/2$ and $\pi/2$
 $\pi/3$ and $3\pi/4$

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $-\pi/2$ and $\pi/2$

- 8) The Secant method formula for finding the cube root of a real number R from the equation $x^3 - R = 0$ is 0 points

- $\frac{x_i x_{i-1} + R}{x_i + x_{i-1}}$
 $\frac{2x_i^2 + x_i x_{i-1} - R}{x_i + x_{i-1}}$
 $\frac{x_i x_{i-1}^2 - 2x_i^2 x_{i-1} + R}{x_i^2 + x_{i-1}^2 - 2x_i x_{i-1}}$
 $\frac{x_i x_{i-1} - R}{x_i^2 + x_{i-1}^2 - 2x_i x_{i-1}}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $\frac{x_i x_{i-1}^2 - 2x_i^2 x_{i-1} + R}{x_i^2 + x_{i-1}^2 - 2x_i x_{i-1}}$

- 9) Using Newton's method to approximate, to within 10^{-4} , the value of x that produces the point on the graph of $y = x^2$ that is closest to $(1, 0)$ is (use initial as $r_0 = 1$) 1 point

- 0.499755
 0.589755
 0.67843
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.589755

- 10) Using method of False position, what is the solution accurate within 10^{-4} for the problem $x^3 + 3x^2 - 1 = 0$ on the interval $[-3, -2]$ (use end points as initial guess) 1 point

- 2.87938
 0.52234
 -2.5278
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

-2.87938