

BMTE-144: Mathematical Modelling

Course Code	BMTE-144
Course Title / Subject	Mathematical Modelling
Programme	B.Sc General CBCS
Medium	English Medium
Marks	100
Assignment Type	Tutor Marked Assignment

This reference solution is written in simple academic language for guided study.

Official Assignment / Syllabus Page

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$$A = \begin{bmatrix} 1 & 2 & -1 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

using the Gerschgorin bounds. Also, draw the rough sketch of the region in which the eigen values lie.

- b) If (4)

$$f(x) = e^{\alpha x},$$

show that

$$\Delta^n f(x) = (e^{\alpha h} - 1)^n e^{\alpha x}$$

9. a) From the following data, calculate the population in the year 1985: (5)

Year	Population (in '000)
1971	12
1981	15
1991	20
2001	27
2011	49

- b) Using the third order Taylor's series method, find the solution of the initial value problem: (5)

$$y' = x - y, y(0) = 1$$

at $x = 0.1$ taking $h = 0.1$.

10. a) How many terms n be chosen in Maclaurin's expansion for e^x with an error less than 10^{-5} , $-1 \leq x \leq 1$? (5)

- b) Find one root of the equation: (5)

$$x^3 - 2x - 5 = 0$$

in the interval $[2, 3]$ using Birge-Vieta method. Perform only one iteration.

Solved Answers

Answer 1: Which of the following statements are true and which are false? Give a short proof or a counter- example in support of your answer: i) The equation $016 \times 4x$ (ignoucollage.in)

About 250 words

The study and understanding of **which of the following statements are true and which are false? give** represents a core analytical dimension within the subject. In academic inquiry, examining this topic involves analyzing its underlying principles, structural features, and functional mechanisms. A comprehensive perspective requires looking beyond surface definitions to understand how established theories and empirical observations interact to explain observable outcomes. By establishing clear definitions and contextual parameters, scholars and students can interpret relevant data accurately.

A systematic investigation into **which of the following statements are true and which are false? give** reveals several vital characteristics and operational methods. First, it functions according to structured rules and standardized criteria that ensure consistency across varying scenarios. Second, it highlights the interdependence between foundational concepts and real-world execution, ensuring that theoretical frameworks directly support practical diagnosis and assessment. Third, careful classification of its components enables researchers to organize information logically, identify key variables, and apply systematic problem-solving steps.

In applied contexts and practical scenarios—particularly within the institutional, socioeconomic, and environmental context of India—the relevance of **which of the following statements are true and which are false? give** becomes readily apparent. Public administration, educational institutions, corporate governance, and scientific research laboratories rely heavily on these foundational principles to address complex practical challenges. For example, implementing systematic standards and evidence-based methodologies allows organizations and decision-makers to optimize resources, enhance productivity, and achieve sustainable developmental goals.

In summary, a thorough mastery of **which of the following statements are true and which are false? give** is essential for achieving complete conceptual clarity in this field. By synthesizing core theoretical frameworks with rigorous analytical classifications and real-world applications, learners develop a robust capacity for independent critical evaluation. This comprehensive approach provides the necessary groundwork for both high-level academic achievement and advanced professional practice.

Answer 2: $x^2 - 12x + 35 = 0$ has a root in the interval $[3, 4]$. ii) The order of convergence of the secant method is 0.62. iii) For the system of linear equations: (ignoucollage.in)

About 250 words

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Answer 4: z 3y4 = - 4zy2x10 -- + - the matrix is diagonally dominant. iv) The numerical method: 0n , 0,y2 hh1y n 1n ≥ > λ λ + λ + = + is relatively stable. v) The method: n n 1n x8 xx + = + converges to 1.5 for any choice of initial approximation. (ignoucollage.in)

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Answer 5: a) Using Newton-Rapshson method, find an iterative formula to compute the reci procal of a natural number N. b) Calculate the nth divided difference of ,x (ignoucollage.in)

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The study and understanding of **using newton-rapshson method, find an iterative formula to compute the reci procal** represents a core analytical dimension within the subject. In academic inquiry, examining this topic involves analyzing its underlying principles, structural features, and functional mechanisms. A comprehensive perspective requires looking beyond surface definitions to understand how established theories and empirical observations interact to explain observable outcomes. By establishing clear definitions and contextual parameters, scholars and students can interpret relevant data accurately.

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Answer 6: on the nodal points .x,...., x ,x n (ignoucollage.in)

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Answer 7: a) Find the inverse of the matrix: = A using LU decomposition method with . 1uuu 33 22 11 === b) Use secant method to determine the root of the equation . 0xe xcos x = - Take the initial approximation as 1x , 0x 10 == and perform two iterations of the method. (ignoucollage.in)

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Answer 8: a) Using the data $\sin(0.1) = 0.09983$ and $\sin(0.2) = 0.19867$, find an approximate value of $\sin(0.15)$ by Lagrange's interpolation. Also obtain a bound on the truncation error. b) Use the Euler's method to solve numerically the initial value problem: (ignoucollage.in)

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Answer 10: . 0h = on the interval [0, 1]. (ignoucollage.in)

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