UE19MA251: LINEAR ALGEBRA AND ITS APPLICATIONS

Question Bank: Unit 1

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| 1. | Explain the row approach to solve the system with a neat diagram. What happens to the solution when the second equation isreplacedby ?  **Answer**: Solution is ; New solution is |
| 2. | Explain the column approach to solve the system with a neat diagram. What happens to the solution if the second equation is replaced by ?  **Answer:** If the second equation is replaced by then the system is singular. |
| 3 | Solve the following systems of equations using Gaussian elimination:  (i)  **Answer**:  (ii)  **Answer**:  (iii)  **Answer**: where is a scalar  (iv) What if the right hand side is ?  **Answer** : Inconsistent system ; |
| 4 | Investigate the values of such that  has (i) unique solution (ii) infinitely many solution (iii) no solution  **Answer:** (i) unique solution when (ii) (iii) should be equal to 7 and i.e., ). |
| 5. | Determine the values of and for which the system of equations ,  willhave  (i) unique nontrivialsolution (ii)trivialsolution ( iii )nosolution (iv) infinity ofsolutions.  **Answer** : (i) and any (ii) and (iii) and  (iv) and. |
| 6. | Let and Use the method of Gaussian Elimination  to find a condition on thecomponentsof so that thesystem is consistent.  When , if is a solution of the system findx.  **Answer**: and .  Whenthen , , Solving we get . |
| 7. | Determine the equation of the polynomial of degree 2 whose graph passes through thepoints  ( 1, 6 ) , and . **Answer** :. |
| 8. | Which three matrices put into a triangular form .  Multiply those’s to get one matrix thatdoeselimination .  **Answer :** |
| 9. | Write down the elementary matrices associated with the system of equations  . Also find the decomposition  of  **Answer :** |
| 10. | Find and for the matrix .  Write down the permutation matrices, if any, used in the process of elimination.  **Answer**:  The permutation matrices used are P23 and P34 |
| 11. | Find and factorization for  **Answer:** |
| 12. | Find factorization for  **Answer**: |
| 13. | Find the symmetric factorization of in the form and find conditions on to get with four pivots. |
| 14. | Suppose is a 4 x 4 identity matrix except for a vector in column 2: Factor into assuming . |
| 15. | Use the Gauss – Jordan method to invert the followingmatrices  .  **Answer**: i. ii. iii. |
| 16. | Producing trucks and planes requires tons of steel, pounds of rubber and  months of labor. If the unit costs are per ton, per pound and per month, what are the values of one truck and one plane?  **Answer**: 6820 , 188000 |
| 17. | Assume that the plate shown in the figure represents a cross section of a metal beam with negligible heat flow in the direction perpendicular to the plate. Let and denote the temperatures at the four interior nodes of the mesh. The temperature at a node is approximately equal to the average of the four nearest nodes – to the right, left, above and below. For instance or  4 . Write a system of 4 equations whose solution gives estimates for the temperatures, and .Hence find its solution.  C:\Users\shangeet2013\Pictures\Screenshots\Screenshot (4).png |
| 18. | Propane is a common gas used for cooking and home heating. Each molecule of propane is comprised of 3 atoms of carbon, and 8 atoms of hydrogen written as C3H8. When propane burns, it combines with oxygen gas O2 to form carbon dioxide CO2 and water H2O. Balance the chemical equation C3H8 + O2  → CO2 + H2O that describes this process.  **Answer**: 2 C3H8 + 10 O2 → 6 CO2 + 8 H2O |