Name:

|  |  |  |
| --- | --- | --- |
| Problem | Points | Score |
| 1 | 25 |  |
| 2 | 25 |  |
| 3 | 25 |  |
| 4 | 25 |  |
| Sub-total | 100 |  |
| Bonus | 25 |  |
| Total | 125 |  |

Notes: The exam is closed book and closed notes.

**(25 pts) Problem No. 1**: Find the inverse of the following matrix: . Verify your solution by demonstrating that multiplication of and its inverse gives an identity matrix. If it doesn’t, debug your result. Note that there are many ways to compute the inverse. You can use these methods to check your solution. Some are simpler to calculate by hand than others. In the end, you will be judged by your ability to debug your calculations, produce the correct result, and verify it.

**(25 pts) Problem No. 2**: Solve the following set of equations:

Again, since you have learned many ways in this course to solve such equations, you will be judged by your ability to debug your calculations, produce the correct result, and verify that your solution is correct. Once you find a solution, verify that it is, in fact, correct, by evaluating the above equations using your solution. This is a requirement for a complete solution.

**(25 pts) Problem No. 3**: Find the eigenvalues and eigenvectors of the following matrices and use this result to determine if these matrices are Hermitian: X , Y . Verify that this makes sense by applying the formal definition of a Hermitian matrix or using other theorems to support your answers. Explain your logic and clearly state what theorems or definitions you are using.

**(25 pts) Problem No. 4**: Find the solution of that satisfies the boundary conditions: and .

**(25 pts) Bonus:** You can only address this question after you have completed the previous four problems. You will only receive credit for this problem if you have produced acceptable solutions to the first four problems. State the most important concept you learned in this class and explain why it is relevant to your chosen engineering discipline. What types of applications can you apply it to? How does it allow you to solve such problems? What insight does it give you into the solution?