18.06 (Fall '12) Problem Set 5

This problem set is due Thursday, October 18, 2012 by 4pm in 2-255. The problems are out of the 4th edition of the textbook. For computational problems, please include a printout of the code with the problem set (for MATLAB in particular, `diary("filename")` will start a transcript session, `diary off` will end one, also copy and paste usually work as well.)

1. Do problem 5 from 4.1

2. Do problem 24 from 4.1

3. Do problem 29 from 4.1

4. Do problem 13 from 4.2

5. Do problem 22 from 4.2

6. Do problem 24 from 4.2

7. Do problem 30 from 4.2

8. Do problem 5 from 4.3

9. Do problem 17 from 4.3

10. The SVD (singular value decomposition) computes bases for all four spaces. In MATLAB the command is [U,S,V]=svd(A); Refer to the table on page 368 of your text.

    Execute

    ```
    >> A=[-1 1 0 0;-1 0 1 0;0 -1 1 0;-1 0 0 1;0 -1 0 1; 0 0 -1 1];
    >> [U,S,V]=svd(A)
    ```

    to compute the SVD of the matrix on page 422 of your text.

    What vector in V spans the nullspace?

    Show numerically that the basis vectors given in V for the rowspace add to 0.

    Which vectors in U span the column space? Use the three small loop vectors (bottom of page 425) to show that these vectors satify Kirchooff's Law that the components add to 0 around a loop.

    Which vectors in U span the left nullspace. Verify Kirchoff's current law.