18.06 Problem Set 3

Due at 4pm on Wednesday, September 28 in 2-106

Please PRINT your name and recitation information on your homework

1. Section 2.7, Problem 24
2. Section 3.1, Problem 4
3. Section 3.1, Problem 19
4. Section 3.1, Problem 27
5. Section 3.2, Problem 23
6. Section 3.2, Problem 25
7. Section 3.3, Problem 3
8. Section 3.3, Problem 6
9. Section 3.3, Problem 8
10. Section 3.4, Problem 5
11. Section 3.4, Problem 32
12. Section 3.4, Problem 33
13. Section 3.4, Problem 34
14. (a) Suppose $A$ is an $m$ by $n$ matrix with $m < n$. A right inverse of $A$ is a matrix $B$ such that $AB = I$. What are the dimensions of $B$ and $I$ in this case?
(b) One can find a matrix $B$ such that $AB = I$ by using MATLAB operation $A \backslash I$. In MATLAB, type $A = [-5 3 2; 4 -2 0]$ to create the matrix $A = \begin{bmatrix} -5 & 3 & 2 \\ 4 & -2 & 0 \end{bmatrix}$ and $I = \text{eye}(2)$ to define $I$ as the 2 by 2 identity matrix. Then input the command $A \backslash I$. MATLAB will then solve the equation $AB = I$ for $B$. What output do you get?
(c) Now try to find a right inverse of $A$ in the “usual” way by row-reducing the augmented matrix $[A I]$. You can do this in MATLAB by entering the command $\text{rref}([A \ I])$. What is the result? Use the resulting reduced matrix to construct a matrix $B$ satisfying $AB = I$ different from the one obtained in part (b).
(d) Explain why $A$ has no left inverse. In other words, why isn’t there a matrix $C$ such that $CA = I$? (What would the dimensions of $C$ and $I$ have to be in this case?)