18.06 Problem Set 1

Due at 4pm on Wednesday, September 14 in 2-106

Please PRINT your name and recitation information on your homework

1. Section 2.1, Problem 10

2. (a) What two vectors are obtained by rotating the plane vectors $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ by 30 degrees in the clockwise direction? Write a matrix A such that for every vector v in the plane, Av is the vector obtained by rotating v clockwise by 30 degrees. (Problem 22 in Section 2.1 is helpful.)

(b) Find a matrix B such that for every 3-dimensional vector v, the vector Bv is the reflection of v through the plane $x + y + z = 0$. (Hint: try $v = (1, 0, 0)$ first.)

3. Section 2.2, Problem 21

4. Section 2.2, Problem 7

5. Section 2.2, Problem 27

6. Section 2.3, Problem 17

7. Section 2.3, Problem 18

8, Section 2.3, Problem 25

9. Section 2.4, Problem 14

10. Section 2.4, Problem 22

11. Section 2.4, Problem 24

12. Section 2.5, Problem 32

13. Do there exist 2 by 2 matrices A and B with real entries such that $AB - BA = I$, where I is the identity matrix?