Last name: *First name:*

Recommended problems - *Please do NOT turn these in*:

- §1.5: 1abcd, 3, 5b, 7a, 15.
- §1.6: 5, 7, 13, 17, 21, 23.
- §1.7: 1c, 3b, 5b, 9,15, 19.

Submitted problems: *Please turn these problems in*: **please show your works – *Do not use calculator***. You may use calculator to check your answers.

(1) Find the inverse for each of the following matrices.
   (a) $A = \begin{bmatrix} -3 & 6 \\ 4 & 5 \end{bmatrix}$
   (b) $B = \begin{bmatrix} 2 & -1 & 0 \\ 2 & 1 & -1 \\ 1 & -3 & 1 \end{bmatrix}$

(2) Solve the system

$$\begin{aligned} 2x_1 - x_2 &= a \\ 2x_1 + x_2 - x_3 &= b \\ x_1 - 3x_2 + x_3 &= c \end{aligned}$$

by using the inverse matrix A^{-1}. *(Note: see problem 1b)*

(3) Let $A = \begin{bmatrix} -3 & 6 \\ 4 & 5 \end{bmatrix}$. Find elementary matrices $E_1,\ E_2,\ \cdots E_n$ such that $E_n \cdots E_2 E_1 A = I$.

(4) Exercise set §1.6: problem 24 (p.66).

(5) Exercise set §1.7: problems 6 , 18, 20.

(6) Indicate whether the statement is always true or sometimes false. Justtify your answer with a logical argument or a counter-example.
   (a) If A is invertible and $AB = AC$, then $B = C$.
   (b) If A and B are invertible, then $A + B$ is invertible.
   (c) Every $n \times n$ matrix can be expressed as a product of elementary matrices.
   (d) An $n \times n$ diagonal matrix is singular if and only if the product of its diagonal entries is 0.
   (e) If a square matrix A satisfies $A^3 + 4A^2 - 2A + 7I = 0$, then so does A^T.