

Homework Sets 1 – 5

All problems given by number are from *Linear Algebra with Applications*, 8th or 9th edition, by Steven Leon.

Class date	Section covered	HW assigned
Wednesday Aug 29	1.1	1ac, 2ac, 3ac, 4ac, 5c, 6e, 7, 9.
Friday Aug 31	1.2	1, 2, 3 & 4 (do together), 5ef, 7, 8 (Hint: put in row echelon form), and 15 (see Application 1, page 17).
Wednesday Sept 5	1.3	1aced, 2ace, 4, 5, 7, 8d. Then do Supplemental Problems 1–4 below.
Friday Sept 7	1.4	1a, 2–4, 9 (Multiply A by itself 3 times), 12 (calculate $A \cdot A^{-1}$), 13, 20 (multiply both sides by $(I-A)$ and simplify), 21 (calculate RR^T).
Monday Sept 10	1.5	1, 2, 3a, 10aeg, and then 7 (first use row operations to transform A to the identity, then express your operations as multiplication by elementary matrices (right-to-left!).

Supplemental Problems.

- For $A = \begin{pmatrix} 1 & 3 \\ 4 & 7 \\ 11 & 10 \end{pmatrix}$, write down $-2A$, A^T , and verify that $(A^T)^T = A$.
- For $A = \begin{pmatrix} 1 & 2 \\ 0 & 1 \\ 1 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$, verify that (a) $2(AB) = (2A)B = A(2B)$, (b) $(AB)^T = B^T A^T$.
- (a) Write down two 2×2 matrices A and B (pick entries at random). Compute AB and BA and show that $AB \neq BA$.
(b) Show that the “identity matrix $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ commutes with any 2×2 matrix, i.e. $IB = BI$ for any $B = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$.
- Consider the linear system $A\mathbf{x} = \mathbf{b}$ where $A = \begin{pmatrix} 1 & 3 \\ 1 & -3 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$, and $\mathbf{x} = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$.
(a) Write this as a system of 2 equations in 2 variables.
(b) Solve the linear system by writing down the augmented matrix, reducing to RRE form, and finding the solution vector \mathbf{x} .