AEP 4210, HOMEWORK #1

DUE FRIDAY, SEPTEMBER 6

To ensure that you get full credit, be sure to *show your work* in the problems that require calculations. Very little credit is given for answers without justification.

You may collaborate with classmates in solving the problems. If you do so, please list their names on your assignment.

1. The Levi–Civita identity is expressed as

$$\epsilon_{ijk}\epsilon_{rsk} = \delta_{ir}\delta_{js} - \delta_{is}\delta_{jr},$$

Notice that the right-hand side does not depend on k because the left-hand side is summed over the dummy index k. Note that i, j, r, s can independently take on the values of 1, 2, or 3 (in a 3-dimensional system). Show that the identity holds for the following values of i, j, r, and s:

(a) $i = 1, j = 2, r = 2$, and $s = 1$
(b) $i = 1, j = 3, r = 1$, and $s = 3$
(c) $i = 1, j = 3, r = 2$, and $s = 1$

Work the following exercises from Kusse–Westwig [KW]:

2. I.2

3. I.3

4. I.6

5. I.10(c)

6. II.1

7. II.3(c)