

AEP 4210, HOMEWORK #4

DUE FRIDAY, SEPTEMBER 27

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.

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

1. [Based on III.8] We begin by determining the relationship between the coordinates of the Cartesian and cylindrical systems.

- (a) Obtain the h_1 , h_2 , and h_3 factors for the cylindrical system.
- (b) Obtain the form of the line, surface, and volume integrals for the cylindrical system. Use the h_1 , h_2 , and h_3 factors from (a). Use geometric arguments to show that the differential arc length, differential surface area, and differential volume elements make physical sense.
- (c) Obtain expressions for the gradient, divergence, and curl in the cylindrical system.

2. III.10

3. III.13

4. III.17

5. III.21

6. III.22