ECE 09.303 Fall 2018
Homework 1

1. Given the vectors M = −10ax +4ay − 8az and N =8ax +7ay − 2az, find:
    a. a unit vector in the direction of −M +2N.
    b. the magnitude of 5ax + N − 3M:
    c. |M||2N|(M + N):
2. The three vertices of a triangle are located at A(−1, 2, 5), B(−4, −2, −3), and C(1, 3, −2).
    a. Find the length of the perimeter of the triangle
    b. Find a unit vector that is directed from the midpoint of the side AB to the midpoint of side BC
    c. Show that this unit vector multiplied by a scalar is equal to the vector from A to C and that the unit vector is therefore parallel to AC.
3. Express in cylindrical components:
    a. the vector from C(3, 2, −7) to D(−1, −4, 2)
    b. a unit vector at D directed toward C
    c. a unit vector at D directed toward the origin
4. Give the result of $\mathbf{a} \cdot \mathbf{b}$ for each of the following:
    a. a = [1, 2], b = [2, 5].
    b. a = [1, 2, 3], b = [2, 5, −7].
5. Give the result of $\mathbf{a} \times \mathbf{b}$ for each of the following:
    a. a = [1, 2, 3], b = [3, 2, 1].
    b. a = i − j + k, b = [3, 2, 1].