Homework 1.

1) Given the vectors

$\vec{A} = 10\hat{a}_x - 5\hat{a}_y + 3\hat{a}_z$

$\vec{B} = -8\hat{a}_x - 4\hat{a}_y + 2\hat{a}_z$

Find: a. $\vec{A} + \vec{B}$ b. $\vec{A} - \vec{B}$

c. $\vec{A} \cdot \vec{B}$ d. $\vec{A} \times \vec{B}$

e. $|\vec{A}|, |\vec{B}|$ f. the unit vector in the direction of $\vec{A}$

2) Given two points A(2, 0, 4) and B(1, 1, 0), find:

   a. the distance between point A and point B
   b. the vector from the origin to point A
   c. the vector from the origin to point B
   d. the vector from point A to point B

3) Given the point C($\rho = 1$, $\varphi = 60^\circ$, $z = 1$) in cylindrical coordinate system, find the rectangular coordinates of C.

4) Given the point P($r = 2$, $\theta = 30^\circ$, $\varphi = 60^\circ$) in spherical coordinate system, find the rectangular coordinates of P.