

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

Department of Electrical Engineering

EE 340 Electromagnetic

Homework 1 (Wednesday Feb. 28)

1- Let $\vec{D} = 4\hat{a}_y + 6\hat{a}_z$ and $\vec{F} = 2\hat{a}_x - 12\hat{a}_y + 7\hat{a}_z$.

(a) Find the component of \vec{D} along \vec{F} .

(b) Determine a unit vector perpendicular to both \vec{D} and \vec{F} .

2-

(a) Convert points $P(1,-4,-3)$, $T(3,0,5)$, $S(-3,6,-8)$ from Cartesian to cylindrical and spherical coordinates.

(b) Transform vector

$$\vec{F} = \frac{x\hat{a}_x + y\hat{a}_y + 4\hat{a}_z}{\sqrt{x^2 + y^2 + z^2}}$$

to cylindrical and spherical coordinates.

(c) Evaluate \vec{F} at T in the three coordinate systems.

3- For the vector $\vec{F} = x^2\hat{a}_x + xy^2\hat{a}_y + yz\hat{a}_z$, determine the integral $\oiint_s \vec{F} \cdot \vec{ds}$ over a cylindrical surface of radius 6 and bounded by planes $z = 0$ and $z = 8$.