EE351 Home Work # 1 Spring 2006
Due: 1/18/2006

Problem 1:
Given vectors

$$\bar{\bar{A}} = \hat{a}_x + 2\hat{a}_y + 3\hat{a}_z$$

$$\bar{\bar{B}} = 2\hat{a}_x + 3\hat{a}_y - 3\hat{a}_z$$

Determine the following:

(i) Unit vectors $\hat{a}_A$ and $\hat{a}_B$

(ii) $\bar{\bar{A}} \bullet \bar{\bar{B}}$

(iii) Angle between vectors $\bar{\bar{A}}$ and $\bar{\bar{B}}$

(iv) Projection of the vector $\bar{\bar{A}}$ along direction $\bar{\bar{B}}$

(v) $\bar{\bar{A}} \times \bar{\bar{B}}$

Problem 2:

$$\bar{\bar{A}} = b\hat{a}_x + c\hat{a}_y + 3\hat{a}_z$$

$$\bar{\bar{B}} = \hat{a}_x - 3\hat{a}_y + \hat{a}_z$$

(i) Determine the values of the constants b and c if $\bar{\bar{A}}$ and $\bar{\bar{B}}$ are parallel to each other.

(ii) Determine the values of the constants b and c if $\bar{\bar{A}}$ and $\bar{\bar{B}}$ are normal to each other.

Problem 3:

$$\bar{\bar{E}} = xy\hat{a}_x + yz\hat{a}_y - x^2\hat{a}_z$$

$$\bar{\bar{B}} = z^2\hat{a}_x - 3xz\hat{a}_y + yx\hat{a}_z$$

Determine the following: (a) $\nabla \bullet \bar{\bar{E}}$; (b) $\nabla \times \bar{\bar{E}}$; (c) $\nabla \bullet \bar{\bar{B}}$; (d) $\nabla \times \bar{\bar{B}}$

Problem: 4

In free space the electric field vector is given by $\bar{\bar{E}} = 100\ e^{j\pi/2} e^{-j\pi z/2}\ \hat{a}_y$

Determine the following

(i) Polarization of the electromagnetic field,
(ii) Direction of propagation,
(iii) Wavelength λ,
(iv) Frequency,
(v) Actual electric field (time domain form)
(vi) Magnetic field vector $\bar{\bar{H}}$

Problem: 5

In free space the electric field vector is given by $\bar{\bar{E}} = 40 \cos(\pi 10^{8} t + \beta z)\, \hat{a}_x$

Determine the following

(i) Polarization of the electromagnetic field,

(ii) Direction of propagation,

(iii) Wavelength λ,

(iv) Frequency,

(v) Magnetic field vector $\bar{\bar{H}}$