SOLUTIONS FINAL ADVANCED DYNAMICS

PROBLEM 3

The electromagnetic field tensor is given by Find (the Einstein summation convention is assumed for identical indices):

1. $F^{\alpha}{}_{\alpha} = 0.$

2.

$$(F_{\alpha\beta}) = \begin{pmatrix} 0 & +E^x & +E^y & +E^z \\ -E^x & 0 & -B^z & B^y \\ -E^y & B^z & 0 & -B^x \\ -E^z & -B^y & B^x & 0 \end{pmatrix} .$$

3. $F_{\alpha\beta}F^{\alpha\beta} = 2 (\vec{B}^2 - \vec{E}^2).$