1. GR 5.10

2. GR 5.12

3. GR 5.14

4. GR 5.16

5. Let F_{ab} be an EM field. Show that

$$\nabla_{[a}F_{bc]} = 2(\nabla_a F_{bc} + \nabla_c F_{ab} + \nabla_b F_{ca}).$$

Then show that Maxwell's equations for the EM field F_{ab} can be written

$$\nabla_a F^{ab} = \epsilon_0^{-1} J^b \tag{1}$$
$$\nabla_{[a}F_{bc]} = 0. \tag{2}$$

where J^b is the current-density 4-vector (ρ, j^1, j^2, j^3).