NOTES FOR THE SECOND HOUR EXAM

Spring 2017

The second hour exam will be held on Wednesday, 19 April. As always, it will be closed book, closed note, with no calculators or other electronic devices allowed. I will provide a list of equations, results, formulae. For this exam, you should be able to:

• Use Einstein summation to prove, verify, or derive vector identities. If the question specifies Einstein summation notation, no credit will be given for a component - by - component analysis.

• Find grad, div, curl in in Cartesiand and other coordinate systems.

• Determine if a force is conservative and compute the work done by a force.

• Use series solutions techniques to find the recursion relation of an ODE, compute coefficients and write the terms of the series solutions.

• Solve Legendre' s differential equation , compute Legendre polynomials, find Legendre series, and use Legendre polynomials to express the potential of a multipole as a series of Legendre summations.

• Be able to prove that Legendre polynomials are orthogonal.

• Use the generating function to derive recursion relations.

• Solve basic PDEs using separation of variables, and fitting boundary and initial conditions.