

615–Maths Methods in Theoretical Physics

Suggestions for Preparing for Midterm 1

- Principal topics covered: Separation of variables for Helmholtz and Laplace equations in two and three dimensions; Series solutions of Legendre and associated Legendre equations; Legendre polynomials, Rodrigues' formula and generating function; Spherical harmonics; Analysis of singular points of 2nd-order ODEs; Nature of series solutions around ordinary points and regular singular points; Wronskian, and construction of second solution; Sturm-Liouville self-adjoint operators.

Hints

- Write legibly!!!
- Present clear, logical arguments, with the important deductive steps spelt out explicitly.
- No memorisation of complicated formulae is expected. If such expressions are required in order to answer the question, then they will be provided.
- Remember that the idea is to convince the grader (i.e. me) that you understand the principles, and are able to apply them logically. So if a derivation of a particular result is requested, based on stated initial assumptions, then do not skip important steps, and do not quote memorised intermediate steps without proof.
- The calculations required will all be fairly simple. If things are looking complicated, make sure that you read the question carefully!