

Reading: PDEs! Chapter 13 sections 1-4. Optional reading on Sturm-Liouville theory (yes, that's the correct spelling!) will be posted early next week

- (1) Consider the Sturm-Liouville eigenvalue problem

$$L | u \rangle + n(n+1) | u \rangle = 0$$

over the interval $-1 \leq x \leq 1$ with boundary conditions that $u(\pm 1)$ are finite and

$$L = (1 - x^2) \frac{d^2}{dx^2} - 2x \frac{d}{dx}$$

- (a) Is L self-adjoint? Explain.
(b) Solve the eigenvalue problem (I recommend "by inspection"), i.e. find the solutions $u(x)$.
(c) Are the solutions orthogonal?
(d) What are the resulting functions normally called?
- (2) Boas pg. 593 problem 7
(3) Boas pg. 637 problem 5