

Math 5327 Assignment 11, due Wednesday, April 25th.

- (1) Read sections 7.7 - 7.9, 7.11. If you are interested in differential equations you are encouraged to read 7.6 and 7.10 as well.
- (2) Ungraded problems: 7.7.7, 7.7.9, 7.8.5, 7.9.1, 7.11.4.
- (3) Consider the differential equation  $\mathcal{L}y = 0$  where  $\mathcal{L}$  is the linear first-order differential operator  $\mathcal{L} = \frac{d^n}{dx^n} + a_{n-1}\frac{d^{n-1}}{dx^{n-1}} + \dots + a_1\frac{d}{dx} + a_0$ . Denote the set of solutions within the space of complex functions  $y(x)$  on  $\mathbb{R}$  with  $n$  continuous derivatives by  $V$ ;  $V$  is a  $n$ -dimensional space. Compute the Jordan form of  $\mathcal{D}|_V$  where  $\mathcal{D}$  is the differentiation operator  $\frac{d}{dx}$ . It may be helpful to think of  $\mathcal{L}$  as  $p(D)$  where  $p(z) = z^n + a_{n-1}z^{n-1} + \dots + a_0$ .