

## Homework Assignment for Week 13

Assigned Dec 08, 2011.

1. Section 6.11: Problems: 17, 21, 23, 27.
2. Verify that both  $\sinh x$  and  $\cosh x$  are solutions of  $y'' = y$  and then solve for

$$y'' = y, \quad y(0) = 1, \quad y'(0) = 2.$$

3. Verify that both  $e^{2x}$  and  $xe^{2x}$  are solutions of  $y'' - 4y' + 4y = 0$ , therefore so is the combination  $a_1e^{2x} + a_2xe^{2x}$ . This is an example of the multiple root case:  $(\lambda - 2)^2 = 0$ . You can either verify by direct differentiation, or try to look for solutions of the form  $z(x)e^{2x}$  and find that this leads to  $z'' = 0$ .
4. Verify by direct differentiation that

$$\frac{d}{dx}(\cos(kx) + i \sin(kx)) = ik(\cos(kx) + i \sin(kx))$$

This is a good explanation why one defines  $\exp(ikx)$  to be  $\cos(kx) + i \sin(kx)$ .

5. Section 7.1: Problems: 9, 37, 47.
6. Section 7.2: Problems: 3, 5, 41.
7. Section 7.3: Problems: 43, 45, 46.