

**Math 450 Winter 2017**

**Homework #1**

- (1) Read 3.4 (excepts discussion on stability) , 3.7 (skip 3.4.7), 4.1 and 4.2  
(2) Verify the following.  
(a) Show that

$$\cos^2 y + \sin^2 y = 1$$

and

$$\cosh^2 y - \sinh^2 y = 1$$

- (b) Solve

$$y' + a_1 y = 1$$

using separation of variables.

- (3) Show that the functions  $e^{ax}$  and  $e^{bx}$  are LI (linearly independent) on  $x \in \mathbb{R}$  when  $a \neq b$ .  
(4) Find the general solution of

$$y'' + 7y = 0$$

and express it in terms of real functions  $\cos x$  and  $\sin x$ .

- (5) Exercise 3.7 Questions 2a, 2b and 2q.  
(6) Using method of variation we found that

$$y_{p_1}(x) = \frac{1}{2}xe^x - \frac{e^x}{4}$$

is a particular solution of

$$y'' - y = e^x.$$

- (a) Verify that  $y_{p_1}$  is a particular solution.  
(b) Find a particular solution  $y_{p_2}$  using method of undetermined coefficients.  
(c) Explain the difference between two particular solutions. What can we say about the difference ?  
(7) Exercise 3.7, questions 4f, 4g.