

## Homework II Due Jun 30, 2011 (in TA section)

Use the "Variation of Parameters" method in 1-5  
( $y = u_1 y_1 + u_2 y_2$  etc.) to solve the following equations  
(use the method even if you can guess the answers!)  
Check your answers by direct verification [Find general solutions in all cases!]

1.  $y'' + y = 1$

2.  $y'' + y = e^x$

3.  $y'' - 2y' + y = e^x$

4.  $y'' - 5y' + 6y = e^{ax}$       $a \neq 2, a \neq 3$

5.  $y'' - 5y' + 6y = e^{2x}$

6. If  $y_1, y_2$  are solutions of  $y'' + p(x)y' + q(x)y = 0$ ,  
show that (1)  $y_1$  and  $y_2$  independent  $\Rightarrow (y_1(x), y_1'(x))$   
and  $(y_2(x), y_2'(x))$  are independent vectors for  
each  $x$  and (2) if  $(y_1(x), y_1'(x))$  and  $(y_2(x), y_2'(x))$   
are independent for some one  $x$  value, then  $y_1$  and  $y_2$   
are independent. Use this to explain why  $W$  is  
either  $\equiv 0$  or nowhere 0 ( $W = W(y_1, y_2)$ ).