

## Math 4009 - Homework: Reduction of Order

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1. Show that if  $y = \phi(t)$  is a solution of  $y'' + p(t)y' + q(t)y = g(t)$ , where  $g$  is not always zero, then  $y = c\phi(t)$ , where  $c$  is any constant other than one, is not a solution.
2. Can  $y = \sin(t^2)$  be a solution on an interval containing  $t = 0$  of an equation  $y'' + p(t)y' + q(t)y = 0$  with continuous coefficients?
3. Use the method of reduction of order to find the general solution of  $tx'' - (1+t)x' + x = t^2e^{2t}$ ,  $t > 0$  given that  $x(t) = 1 + t$  is a solution of the associated homogeneous problem.
4. Use the method of reduction of order to find the general solution of the differential equation  $t^2y'' - t(t+2)y' + (t+2)y = 0$ ,  $t > 0$  given that  $y(t) = t$  is a solution.
5. Use the method of reduction of order to find the general solution of  $ty'' - (1+t)y' + y = t^2e^{2t}$  for  $t > 0$  given that  $y(t) = 1 + t$  is a solution of the associated homogeneous problem.

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