

## MATH 2070 HOMEWORK 4

1. Find the interval of existence for the following IVPs

(a)  $t^2 y'' + ty' + 6y = 0, y(-1) = 2, y'(-1) = 3$

(b)  $y'' - (\cot(t - \pi/6))y' + (\ln(2t + 3))y = e^{5t}, y(1) = 0, y'(1) = 2$

2. Check that  $y_1, y_2$  are solutions of the ODE. Check also that  $y_1, y_2$  are linearly independent.

(a)  $y_1 = e^{2t} \sin t, y_2 = e^{2t} \cos t, y'' - 4y' + 5y = 0.$

(b)  $y_1 = e^{3t}, y_2 = te^{3t}, y'' - 6y' + 9y = 0$

(c)  $y_1 = t^3, y_2 = t^4, t^2 y'' - 6ty' + 12y = 0$

3. Find the general solution to the following ODEs

(a)  $y'' - 7y' + 12y = 0$

(b)  $y'' - 5y' - 6y = 0$

(c)  $y'' + 10y' + 23y = 0$

4. Find the solution to the following IVP and determine the long term behavior. (Hint: look at where the limit goes)

(a)  $y'' - 25y = 0, y(0) = 3, y'(0) = -9$

(b)  $y'' - y' = 0, y(0) = 3, y'(0) = 2$

(c)  $6y'' + 5y' - 4y = 0, y(0) = 0, y'(0) = 0$