

Math215/255 Section 104 Quiz 5 (15 Minutes)

Name:..... Student Number:.....

November 7, 2017

Instructions: Attempt ALL questions.

Question One:

Consider the following second order ODE

$$y'' + y = t^3 + \sin(t) \tag{1}$$

- (a) Write this equation as a system of first order equations. Show the your details.
- (b) Find the homogeneous solution of the second order ODE.
- (c) Suppose you want to find the particular solution of the ODE in Equation 1 using the method of undetermined coefficient, what will be your guess for y_p ?

Question Two:

Consider the forced system

$$\vec{Y}'(t) = \begin{pmatrix} -2 & 1 \\ 1 & -2 \end{pmatrix} \vec{Y} + \vec{g}(t),$$

where $\vec{Y}(t) = \begin{pmatrix} y_1(t) \\ y_2(t) \end{pmatrix}$ and $\vec{g}(t) = \begin{pmatrix} 2e^{-t} \\ 3t \end{pmatrix}$.

- (a) Find the homogeneous solution of the system.
- (b) Use the method of undetermined coefficient to find the particular solution of the system.
- (c) Use $\vec{Y}(0) = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ to find the constant in the general solution of the system.