MATH 252: Elementary Differential Equations

Quiz 7

NAME: —————————————————————— Date: November 10, 2016

Solve the following problems on this sheet of paper. **Note that there is a problem on the back.** No calculators or other electronic devices are permitted.

1. (6 points) Consider the system

$$\frac{d\mathbf{Y}}{dt} = \begin{pmatrix} -2 & -1 \\ 1 & -4 \end{pmatrix} \mathbf{Y}.$$

(a) Find all eigenvalue(s) of the above system.

(b) Find a corresponding eigenvector for each eigenvalue.

(c) Sketch the phase portrait, including the solution curve with initial condition $\mathbf{Y}_0 = (1,0)$.

(d) Sketch the $x(t)-$ and $y(t)-$graphs of the solution with initial condition $\mathbf{Y}_0 = (1,0)$.

2. (4 points) Find the solution of the IVP:

$$\frac{d^2y}{dt^2} - 8\frac{dy}{dt} + 16y = 0, \quad y(0) = 3, \quad y'(0) = 11.$$