MATH 252: Elementary Differential Equations

Quiz 3

NAME: _____ Date: October 5, 2017

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) Solve the following initial-value problem (IVP):

$$\begin{cases} \frac{dy}{dt} & = \frac{2y}{t} + 2t^2 \\ y(-2) & = 4. \end{cases}$$

2. (4 points) The graph below is the graph of a function $f(y)$. Describe the bifurcations that occur in the one-parameter family

$$\frac{dy}{dt} = f(y) + \alpha$$

Hint: You do not need to be absolutely precise, but you should be able to give me approximate values of α that yield bifurcations. Do not forget to describe the behavior that is changing at the bifurcation value.