Part One: *Quick and Easy...*

1. Locate the bifurcation values for the one parameter family $\dfrac{dy}{dt} = f_a(y) = y^2 + 6y + a$ and sketch the bifurcation diagram.

2. Locate the bifurcation values for the one parameter family $\dfrac{dy}{dt} = f_\alpha(y) = f(y) + \alpha$ where $f(y)$ is the function pictured.

3. Find the general solution of $\dfrac{dy}{dt} - 2y = 3e^{2t}$.

4. Find the general solution of $\dfrac{dy}{dt} = 3y - 13\sin 2t$.

Part Two: *A Look Ahead...*

1. If $y = y(t) = a_0 + a_1 t + a_2 t^2 + \cdots = \sum_{n=0}^{\infty} a_n t^n$, what is $\dfrac{dy}{dt}$?

2. Using the substitutions above, find the solution to $\dfrac{dy}{dt} = ty + 1$ satisfying $y(0) = 1$. *Hint*: What is a_0? Also find the general solution.

3. Using the substitutions above, find the solution to $\dfrac{dy}{dt} = 2y + e^{2t}$ satisfying $y(0) = 0$. Then find the solution using the guess-and-check technique. Verify that the answers are the same.