In class, we introduced the Fitzhugh-Nagumo model (http://www.scholarpedia.org/article/FitzHugh-Nagumo_model), which in its general form is the following:

$$\frac{dV}{dt} = V - \frac{1}{3}V^3 - w + I, \quad (1)$$

$$\frac{dw}{dt} = \epsilon(b_0 + b_1 V - w), \quad (2)$$

where I is an input current.

1. Try to explain what the parameters of these equations correspond to biophysically.

2. Derive the null clines. How many solutions are there?

3. Sketch and describe the flow in the phase plane for $b_1 > 1$. What happens as one increases I ? Sketch the *f-I* curve (the firing rate as a function of current input) for this case.

4. Sketch and describe the flow for $b_1 < 0$. How is this case different?