5. [12 points] In lab 4 we consider a forced electrical system of the form

$$y'' + 2\gamma y' + \omega_0^2 y = F(t),$$

which models the current in a circuit. In this problem we take $\gamma = 1$ and $\omega_0 = 3$.

a. [7 points] Carefully sketch a qualitatively accurate graph of the steady state response current to a forcing voltage $F = k\sin(\omega t)$. Explain what functions appear in the response and therefore why your graph has the form it does. As possible, give information about the relative position of significant features of your graph. *(Note that you do not need to, and probably do not want to, solve for the steady state response.)*

b. [5 points] Now suppose that

$$F(t) = I(t) = \begin{cases} \frac{1}{a}, & c \le t < c + a \\ 0, & \text{otherwise,} \end{cases}$$

and that $y(0) = y'(0) = 0$. Make two sketches showing the behavior of the solution for $t > c$, first if a is large and second if a is small. In either case you will want to say something about what functions contribute to the behavior you are graphing, but need not, and probably should not, completely solve the problem.