

1. **(40 points)** Write  $\sum \vec{F} = m\vec{a}$  for a *damped* harmonic oscillator (As in Assignment 1) with an external, time-dependent driving force,  $F_{ext}(t) = F_0 e^{i\omega t}$ . Solve for  $x(t) = A e^{i\omega t}$  and find  $A$ .
2. **(30 points)** Sketch a graph of  $|A|$  vs  $\omega$ . Is there resonance here as in the undamped oscillator? What strikes you as different in the damped case?
3. **(30 points)** The maxima and minima of  $|A|(\omega)$  can be obtained by finding the derivative of  $|A|$  with respect to  $\omega$  and the values of  $\omega$  where this derivative is zero. Find these maxima and minima. Check whether you get the undamped SHO results when  $b = 0$ .