Exam II review

1. Expand $3\cos(2t-\pi/3)$ as $a\cos(2t)+b\sin(2t)$. Write $\cos(3t)-\sin(3t)$ in standard form.
2. Consider the equation $x''+bx'+9x=0$.
   - For what values of b is it underdamped? Overdamped? Critically damped?
   - Suppose we observe that $x(\pi/4)$ and $x(3\pi/4)$ are both zero. Which of the above cases must we be in? What must be the value of b?
3. What is the general solution to

$$x''+3x'+2x=4e^t+e^{-2t}+(12t^2+14t+14)e^{2t}+t^2+e^t\cos(t)+e^t\cos(t+\pi/4)$$

4. Think about the equation $x''+2x'+kx=\cos(2t)$. How does the gain change as k incrseases? The phase lag? For what value of k is there a $-\pi/2$ phase lag? $-\pi/4$?