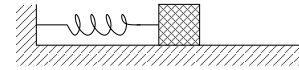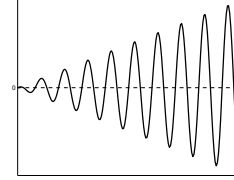**4.** [12 points]  Consider the differential equation $x'' + a\,x' + b\,x = A_0 \cos(\omega t)$, modeling dispacement $x$ of the mass in the mass-spring system shown to the right. In this equation, $a$, $b$, $A_0$ and $\omega$ are constant parameters.

**a.** [6 points]  If a representative graph of $x$ as a function of time $t$ is shown in the figure to the right, can you determine if any of $a$, $b$, $A_0$ or $\omega$ must be zero or must be non-zero? Must any of $a$, $b$, $A_0$ or $\omega$ be related in any way? Can you tell what value any of them must have?

**b.** [6 points]  If a representative graph of $x$ as a function of time $t$ is shown in the figure to the right, can you determine if any of $a$, $b$, $A_0$ or $\omega$ must be zero or must be non-zero? Must any of $a$, $b$, $A_0$ or $\omega$ be related in any way? Can you tell what value any of them must have?