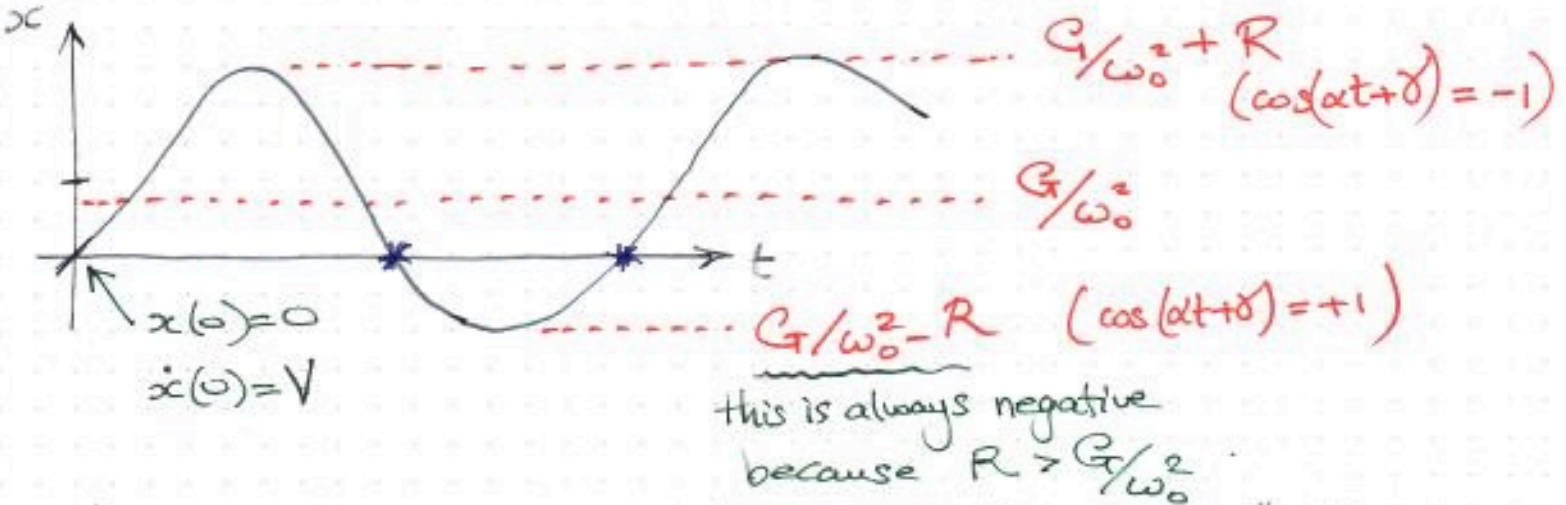

this is always negative because $R > G/\omega_0^2$.

The cyclist starts to oscillate up & down hill without stopping. (oscillation of amplitude R about $x = A = \frac{G}{\omega_0^2}$)

Damping of the spring is needed to avoid oscillations & bring the cyclist to rest.

* the model has an issue: when $x(t)$ reaches $x=0$, the cyclist should in principle lose contact with the barrier. So we should solve a different ODE past the first zero crossing in the picture.

(ie. $m\ddot{x} = g\cos\theta$ without $-kx$)

But this is not part of the stated problem.