Problem 402A

This problem concerns a bubble growing in an infinite liquid (according to the Rayleigh-Plesset equation) when the pressure far from the bubble is $10,000 kg/m\ sec^2$ (or 0.1 atmospheres) less than the vapor pressure of the liquid. Assume the density of the liquid is $1000 kg/m^3$ and the surface tension is $0.07 kg/sec^2$. Neglect any viscous effects. If we seek only constant rates of growth ($d^2R/dt^2 = 0$) find

1. the velocity of growth (dR/dt) when the surface tension is neglected
2. the velocity when surface tension is included and the bubble has a radius of $100 microns$ ($10^{-4} m$)
3. the critical size of the bubble which is in equilibrium (does not grow) under these conditions (include surface tension).