Terminal Velocity or “Oops, I forgot my reserve!”: A skydiver jumps from an aircraft at an initial altitude of 10,000 ft. Assume that she falls vertically with initial velocity zero, weighs 128 lb so her mass is 4 slugs, and experiences an upward force $F_R$ of air resistance given in terms of her velocity $v$ (in feet per second) by

$$F_R = (0.01)v + (0.001)v^2 + (0.0001)v^3$$

in pounds, and with the coordinate axis directed downwards so that $v > 0$). If she does not open her parachute, what will be her terminal velocity? How fast will she be falling after 5s have elapsed? After 10s? After 20s?

Recall Newton’s Law: $F = ??$