Definitions, results, etc.

* \[ r = R(t) \frac{d\sigma}{d\tau} \]
* \[ H = \frac{1}{R} \frac{dR}{dt} \]

Densities:

Matter: \( \rho_m = \rho_o m R^{-3} \)
Radiation: \( \rho_r = \rho_o r R^{-4} \)
Dark energy: \( \rho_\Lambda = \rho_o \Lambda R^0 \)

\[ \rho_c(t) = \frac{3H^2(t)}{8\pi G} \]
\[ \Omega(t) = \frac{\rho(t)}{\rho_c(t)} \]
\[ \Omega = \Omega_m + \Omega_{\text{rel}} + \Omega_\Lambda \]

\[ \rho = \frac{u}{c^2} \]

\[ (ds)^2 = (c\, dt)^2 - R^2(t) \left[ \left( \frac{d\sigma}{\sqrt{1 - k\omega^2}} \right)^2 + (\omega\, d\theta)^2 + (\omega\, \sin \theta\, d\phi)^2 \right] \]

\( dU = -PdV \)

Curvature \( k = \frac{1}{R_0^2} \times \frac{+1}{-1} \)

Cosmological Constant (a.k.a. Dark Energy)

\( \Omega_\Lambda \)

\( \Omega_{\text{matter}} \)

\( \Omega \)

\( d^2R \)

\( \frac{d^2R}{dt^2} = \left\{ -\frac{4}{3} \pi G \left[ \rho_m + \rho_{\text{rel}} + \frac{3(P_m + P_{\text{rel}})}{c^2} \right] + \frac{1}{3} \Lambda c^2 \right\} R \)

* = you should be able to write these down from memory.