$$\frac{da}{a_0\sqrt{\frac{a^2}{a_0^2}\left(\Omega_m+\Omega_R+\Omega_\Lambda+\Omega_K\right)}} = H_0\,dt$$

$$\Omega_m(t) = \Omega_m^0(t_0)\cdot\frac{a_0^3}{a^3} \qquad \Omega_R = \Omega_R^0(t_0)\cdot\frac{a_0^4}{a^4}$$

$$\Omega_\Lambda(t) = \Omega_\Lambda^0(t_0) \qquad \text{"}\Omega_K(t)\text{"} = \Omega_K^0\cdot\frac{a_0^2}{a^2}$$

$\simeq 0.7$ today

$$\Omega_K^0 = -\frac{kc^2}{H_0^2 a_0^2}$$

$$\frac{da/a_0}{\sqrt{\Omega_m^0\frac{a_0}{a}+\Omega_R^0\frac{a_0^2}{a^2}+\Omega_\Lambda^0\frac{a^2}{a_0^2}+\Omega_K^0}}$$

PUZZLES

1) Why is Ω_K so small?
2) Why $p/\gamma \simeq 10^{-9}$? Why not 0
3) Uniformity of T across CMB?
4) Why is there <u>any</u> variation at all?

<u>Inflation</u>

a) DM
b) DE (Λ)
c) Inflatons

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$$\frac{da/a_0}{a/a_0} = \sqrt{\Omega_\Lambda^0}\cdot\frac{a}{a_0}H_0\,dt$$

$$\ln\frac{a(t)}{a_0} = \sqrt{\Omega_\Lambda^0}\,H_0(t-t_0) \;\rangle\; a(t) = a_0\cdot e^{\sqrt{\Omega_\Lambda^0}H_0(t-t_0)}$$