

Homework problems #2

1. Consider a universe containing a matter that satisfies equation of state $p = w\rho$, with w being a constant.
 - In a flat universe show that for any w the energy density satisfies the relation $\rho \cdot t^2 = c = \text{const}$.
 - For $k = \pm 1$ check if there exists w such that $\rho \cdot t^2 = c = \text{const}$. If so, find w . Are there any extra constraints to be satisfied in this case?

In both cases find the constant c in terms of the scale factor at certain initial time t_i ; $a_i \equiv a(t_i)$, or as a function of the energy density at t_i , $\rho_i \equiv \rho(t_i)$.