Homework problems #2

1. Consider a universe containing a matter that satisfies equation of state $p = w\rho$, with w being a constatnt.

   - In a flat universe show that for any $w \neq -1$ 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 w or in terms of certain initial time t_i and corresponding scale factor $a_i \equiv a(t_i)$.