HW #3 (229C), due Oct 21, 4pm

1. Using the conservation of \( n_b/s \) and the current value \( n_b/n_\gamma = 6.5 \times 10^{-10} \), work out the asymmetry in the quark number

\[
A_q \equiv \frac{n_q - n_{\bar{q}}}{n_q + n_{\bar{q}}}
\]  

before the QCD phase transition.

2. Work out the redshift at the matter-radiation equality.

3. Work out the redshift at the photon decoupling.