Physics 212: Problem Set 4

Due on October 7 (at noon), 2016

Problem 1:

a) Assuming slow-roll inflation , express the tensor-to-scalar ratio in terms of slow-roll parameters.

b) Write down the tilt of the scalar power spectrum (given by $n_s - 1 = d\ln\Delta^2_{\mathcal{R}}/d\ln k$) in terms of the slow-roll parameters (going up to first order only in slow-roll parameters).

c) Express the tilt of the tensor power spectrum (give by $n_t = d\ln\Delta^2_t/d\ln k$) in terms of slow-roll parameters (going also up to first order only in slow-roll parameters).

d) Using your answers in a) and c), write r in terms of n_t. This relation is known as the "single-field slow-roll consistency relation". Any violation of this condition found in the data, would violate the assumption of slow-roll single-field inflation, and would shed light on the physics of inflation!