

## Homework 20

1. (10 points) The gain of a FEL oscillator (i.e. FEL working in low gain regime) depends on the energy of the electron beam. Using the results derived in the lecture, find the electron beam energy for maximal gain in a FEL oscillator. Assume that the undulator length is  $l_w$ , the undulator period is  $\lambda_w$ , the undulator parameter is  $K$  and the radiation wavelength is  $\lambda_0$ .