

## 22.106 Neutron Interactions and Applications (Spring 2005)

### Problem Set No. 5

Due: April 14, 2005

#### Problem 1

Derive Eq.(10.11) in Lecture 10 and explain in what way is this result useful.

#### Problem 2

Explain the concept of extrapolated boundary in solving neutron diffusion problems. For what situations is this boundary condition valid? When is it not valid?

#### Problem 3

Explain what is the geometric buckling in solving the neutron diffusion equation for a critical spherical reactor, and derive an expression for it.

#### Problem 4

Show how the neutron multiplication constant  $k$  can be written in the form of Eq. (11.9) and define all the quantities that appear in this expression in terms of cross sections and any other similar basic nuclear data. Give typical values for each of the four components of the infinite medium multiplication constant. Which do you think is larger between the fast and thermal nonleakage probabilities?