

Name:

ID:

1. (2 marks each) Briefly define the following terms:
 - a. fissionable

 - b. alpha particle

 - c. photo-neutron

 - d. flux

 - e. elastic scatter

2. (2 marks each) Name and outline the form of the equation which describes the energy distribution of:
 - a. thermal neutrons

 - b. fission neutrons

3. (2 marks) What are the average and most probable energies, in MeV, of neutrons born in fission?

4. Following a scatter event, there are changes to the distribution of energy among the particles involved. We have discussed the changes in the neutron energy.
 - a. (2 marks) What happens to the rest of the energy?

 - b. (3 marks) Discuss the consequences for reactor design.

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5. (4 marks) Recall the definition of ζ as the number of fission neutrons produced per thermal neutron absorbed in the fuel. Write an expression for ζ for a mixture of U-235 and U-238, where the fractional U-235 enrichment is denoted by f .

Bonus question: any marks attained will only be used to increase your total.

6. (5 marks) Show the mean free path for a neutron interaction is $1/\bar{\sigma}$, where $\bar{\sigma}$ is the macroscopic cross-section.