**AME 480/580**

**Spring 2018  
Final Exam**

**Due: 5/5/18**

1) Write down multiplying, 1D, steady state, diffusion equation with uniform source in slab geometry. Assume vacuum boundaries on both sides (flux at ends is zero). Find the solution for k\_inf < 1 and k\_inf > 1. (20 pts)

2) Suppose you were given the task of finding multiplication factor, k, for a 3D multiplying system in absence of external source. How would you go about doing this? (Hint: numerical criticality search). (20 pts)

3) Problem 1.3 from textbook (5 pts)

4) Problem 1.6 from textbook (5 pts)

5) Derive Bateman equations (10 pts)

6) Problem 2.7 from textbook (5 pts)

7) What is the minimum number of elastic scattering collisions required to slow neutron down from 1 MeV to 20 eV in C-12? (5 pts)

8) Derive an expression for flux in terms of slowing down density. (10 pts)

9) Problem 4.8 from textbook (use equations and data given in textbook and make a judgment) (10 pts)

10) For a 1D sphere with macroscopic absorption xs of 0.3 cm-1, fission xs of 0.1 cm-1 and average neutrons per fission of 2.4, determine a) k\_infinity, b) material buckling, c) critical radius. (10 pts)

EXTRA CREDIT (20 pts):

a) Review and summarize Ch 1 (2.5 pts)

b) Review and summarize Ch 2 (2.5 pts)

c) Review and summarize Ch 3 (2.5 pts)

d) Review and summarize Ch 4 (2.5 pts)

e) Review and summarize Ch 5 (2.5 pts)

f) Review and summarize Ch 6 (2.5 pts)

g) Summarize numerical algorithms you learned in this class (5 pts)