Assignment 10
Due 11/13/2025

Short Answer Problems

1. Explain the importance of having correct kinetics values input into RELAP. (Do not just say an error will occur)

Application Problem 1

Create a separable point kinetics input in a RELAP5-3D input file with the below information:

- Use fission product decay plus actinide decay calculations
- A reactor with a total power of 1200 MW
- Initial reactivity is 0.0
- Initial steady state temperature of the reactor is 2000°F
- Delayed neutron fraction is 0.0056
- Prompt Neutron lifetime is 0.025ms
- Use ANS79-1 Fission product type
- Assume the power history is infinite operation at full power
- You do not need to input weighting factors
- Create a density feedback table from a density of 3lb/ft^3 to 60lb/ft^3
    - Reactivity (%) = 42.056*ln(density(lb/ft^3)) - 162.88
- Create a doppler reactivity table from a temperature of 300°F to 6000°F
    - Reactivity (%) = (-0.0000176°F^{-1})*(ΔT)
- All other values can be left at default or just use a reasonable guess

You only need to create the kinetics input, not a full input deck. Please remember to comment all lines and keep close track of any calculations that are preformed.

Project Problem 1

Please incorporate full kinetic feedbacks into your reactor core, based on literature values. To do this, comment the feedbacks into your core until you reach steady state, then PGYI the file with comments removed. Validate that these feedbacks work by adjusting core power and plotting the resulting power/temperature in the core.