Question 1

I am asking you to calculate the "fuel-temperature reactivity coefficient". This is the derivative of k-eff with fuel temperature, and can be approximated as $\frac{\Delta k_{eff}}{\Delta T_{fuel}}$.

You can calculate it from the difference between the k-eff value obtained with the reference value of fuel temperature (reference case) and the k-eff from the perturbation case using a fuel temperature say 50 degrees higher. Since you want a derivative, you should not change the temperature by a very large value (100 degrees or more is too much).

My meaning of plotting against "average exit burnup" was I guess not clear enough. I apologize for this.

I'm asking you to calculate the coefficient $\frac{\Delta k_{eff}}{\Delta T_{fuel}}$ .not at various values of exit irradiation or burnup. That is, we have to pretend we are running the reactor at different values of exit burnup, rather than at the actual CANDU value (~7500 MWD/Tonne (U)). The exit irradiation is the "Exposure" column in a reaction-rate-averaged run, and the corresponding "average exit burnup" is given in the column "MWD/TONNE UMET". Then you can plot the coefficient versus average exit burnup. (Plot against average exit burnup, not average exit irradiation.)

Remember to use the reaction-rate-averaged option, because that is the option for which "Exposure" means "Average Exit Irradiation". That is, parameter 71 should be input as 1.0 (not 2.0, which is for instantaneous runs).

I'm not asking you to explain the variation you find, but just to indicate if the coefficient changes sign at some point in average exit burnup.

Question 2

You are asked to calculate the "reactor power coefficient of reactivity", i.e., $\frac{\Delta k_{eff}}{\Delta RP}$.

You can relate this coefficient to the fuel-temperature reactivity coefficient, and use the results from Question 1 to calculate. Again, you need to make sure you are using reaction-rate-averaged runs and are plotting against average exit burnup, not average exit irradiation.

Question 3

There should not be much difficulty interpreting this question correctly. The only thing is that I asked you to plot the changes in the 4 factors, rather than the 4 factors themselves. The last part of the question ("Can you think why?") is probably too difficult, because we did not cover void reactivity in class yet. So you don't need to answer this part.