**Problem 3**

**3a**

****

The fluctuations depended more on J than n, as can be seen from the magnitude of the energy fluctuations.



**3b**

They varied with J. 

f =

General model:

f(t) = A\*exp(-t/tau1) + B

Coefficients (with 95% confidence bounds):

A = 0.1418 (-0.1216, 0.4052)

B = -0.2034 (-0.2038, -0.2031)

tau1 = 1049 (60.14, 2037)

f =

General model:

f(t) = A\*exp(-t/tau1) + B

Coefficients (with 95% confidence bounds):

A = 0.4781 (0.3402, 0.6161)

B = -0.6317 (-0.6322, -0.6312)

tau1 = 1427 (1159, 1695)

f =

General model:

f(t) = A\*exp(-t/tau1) + B

Coefficients (with 95% confidence bounds):

A = 0.8241 (0.7699, 0.8784)

B = -1.336 (-1.336, -1.335)

tau1 = 2523 (2370, 2675)

f =

General model:

f(t) = A\*exp(-t/tau1) + B

Coefficients (with 95% confidence bounds):

A = 1.214 (1.157, 1.272)

B = -2.434 (-2.436, -2.432)

tau1 = 5875 (5545, 6206)

**3c**

****

The fit for this one was not good. I tried varying the start points, but could not find a suitable one.

**f =**

General model:

f(t) = A\*exp(-t/tau1) + B\*exp(-t/tau2)

Coefficients (with 95% confidence bounds):

A = -16.89 (-4.988e+06, 4.988e+06)

B = 16.55 (-4.988e+06, 4.988e+06)

tau1 = 1.014e+04 (-1.45e+07, 1.452e+07)

tau2 = 1.005e+04 (-1.475e+07, 1.477e+07)

f =

General model:

f(t) = A\*exp(-t/tau1) + B\*exp(-t/tau2)

Coefficients (with 95% confidence bounds):

A = -7.269 (-2.657e+05, 2.657e+05)

B = 6.059 (-2.657e+05, 2.657e+05)

tau1 = 1.039e+04 (-7.006e+06, 7.027e+06)

tau2 = 1.001e+04 (-8.288e+06, 8.308e+06)

f =

General model:

f(t) = A\*exp(-t/tau1) + B\*exp(-t/tau2)

Coefficients (with 95% confidence bounds):

A = -56.03 (-3.954e+06, 3.954e+06)

B = 53.94 (-3.954e+06, 3.954e+06)

tau1 = 1.037e+04 (-7.065e+06, 7.085e+06)

tau2 = 1.017e+04 (-7.284e+06, 7.305e+06)

f =

General model:

f(t) = A\*exp(-t/tau1) + B\*exp(-t/tau2)

Coefficients (with 95% confidence bounds):

A = -5.832 (-874.6, 862.9)

B = 1.755 (-860.8, 864.3)

tau1 = 1.199e+04 (-3.111e+05, 3.35e+05)

tau2 = 8055 (-9.161e+05, 9.323e+05)

**3d**

****

The equil times were different from the previous case.

f2 =

General model:

f2(t\_cn) = D\*exp(-t\_cn/tauc)

Coefficients (with 95% confidence bounds):

D = 109.2 (106.9, 111.6)

tauc = 4.362e+10 (-5.181e+13, 5.19e+13)

f2 =

General model:

f2(t\_cn) = D\*exp(-t\_cn/tauc)

Coefficients (with 95% confidence bounds):

D = 296.1 (290.4, 301.7)

tauc = 6.442e+10 (-7.044e+13, 7.057e+13)

f2 =

General model:

f2(t\_cn) = D\*exp(-t\_cn/tauc)

Coefficients (with 95% confidence bounds):

D = 716.2 (703.1, 729.3)

tauc = 1.107e+11

f2 =

General model:

f2(t\_cn) = D\*exp(-t\_cn/tauc)

Coefficients (with 95% confidence bounds):

D = 1910 (1874, 1946)

tauc = 2.121e+11

**3e**