Essay 1
(20 points)
In the experiment described in essay 2, the hot water is at 60 ^{0}C and the cold water is at 10 ^{0}C. You begin the experiment by starting to collect data (for some time) while the two probes are in water at some initial temperature ($T_{initial}$). You pull the probes out and put one probe in the hot water and the other one in the cold water and wait till the mixture comes to equilibrium. Draw the graphs of temperature (Y axis) vs. time (X axis) if the initial temperature "$T_{initial}$" is
a) 80 ^{0}C
b) 40 ^{0}C
c) 0 ^{0}C
(You will be drawing 3 graphs). Explain each part of the graph carefully.

Essay 2, 20 points
In class, we took a bag full of hot water and put it into a cup of room-temperature water. We observed the temperatures of the water in the bag and the water in the cup versus time. What did we learn by doing the experiment? Describe in detail how the observations from the experiment support your conclusions about what we learned for instance discuss how does the final temperature depend on the amounts of hot and cold water used. Explain with graphs. Can you also explain using the mathematical formula for heat that we developed?