Brandon Lee

5/21/14

R1000

Assignment 4

1. **Understanding the Problem**
   1. The problem is asking me to make a calculator for a 1D heat diffusion model. This problem will simulate the diffisuion of heat through a 1D object using “the explicit method to solve for new time instances”.
2. **Devising a Plan/Design**
   1. In order to create a design for assignment 4, we will need to take into account the different heat equations at bay such as:

\frac{\partial u}{\partial t} -\alpha\left(\frac{\partial^2u}{\partial x^2}+\frac{\partial^2u}{\partial y^2}+\frac{\partial^2u}{\partial z^2}\right)=0

We will also need to take into account several other equations such as :

1. f'’(x) ≈ ( f(x + h) - f(x) ) / h
2. f'’’(x) ≈ ( f(x + h) - 2 \* f(x) + f(x - h) ) / h \* h
3. 𝑢𝑥
4. 𝑡+∆𝑡
5. We will also take into account the following?:
   * Material Parameters: thermal conductivity (k), density (ρ), specific heat (c)
   * Initial and Boundary conditions
   * Material Length and how to divide length
   * Time Intervals and change in time
   * Time instance and values of all elements of 1-D object at that time instance
6. **Looking Back/Self-Reflection**
   1. Looking back, I’ve learned a ton about file I/O from this assignment. It provides us with multiple ways to program with multiple types of files. This gives us a whole new universe to program and play around with.
7. **Design for Assignment #5**
   1. First I will start off by declaring variables for each of the possible user inputs that the user can have. Next I will create multiple structs as indicated here:

struct node {

int number;

node \*next;

};

…

struct node \*head;

Finally I will work on rearranging the nodes in the list so that they can be sorted by ascending order or descending order.