**N-Body Simulation FAQ**

***Omg! How can forces have negative values?!***

Forces are *vectors*, meaning they have a direction in addition to a magnitude. Similarly, velocity and acceleration can be negative (you should not "fix" sign issues). In contrast, the mass of a body does not have a direction and is therefore considered a scalar.

***What does the "e" represent in the input files?***

The "e" (scientific notation) denotes raising 10 to the power of something. In the case of the gravitational constant, 6.67e-11 represents 6.67 \* 10-11. Java understands scientific notation for floating-point literals.

***What in the world is the*** *this* ***keyword and when do I use it?***

The this keyword is used to refer to "this" object, the object calling a method. It can be used to distinguish between local variables and instance variables (e.g. this.x would distinguish the object's *instance* variablex from another *local* variable x). It can also be used as a reference to the entire current object, as in the setForce method. If this doesn't make sense, don't worry! You'll learn much more about this in the future inheritance labs.

***What is the function of the*** *continue* ***keyword?***

The continue keyword (which must be inside a loop) immediately returns control to the test condition in a while loop and the update portion in a for loop, skipping any code that follows. It is similar to the break keyword, except that it does not (necessarily) terminate the loop. There's a CS1 powerpoint for more info.

***My*** *setNetForce* ***method always sets net forces to 0.0. What could cause this?***

Make sure you're using the pairwise forces' X- and Y-components in this method. Simply summing up the net forces of each Body object without factoring in the pairwise forces will not work. Also, check that you are summing up the other bodies' forces correctly.

***How often should I update the Body's accelerations, velocities, and positions?***

You update the bodies' instance variables every time step (dt) in the run method. This update should be applied to all bodies in the simulation.

***Why are my planets quickly zipping toward the \_\_\_ corner when I first run my program?***

Your net force calculations may be including the forces exerted in previous time steps, thereby distorting the total gravitational pull exerted on each body (hence the swift movement). Make sure you zero out the X- and Y-net forces in your setNetForce method each step.

***Why doesn't my program work or do \_\_\_ properly?***

There are a lotof places things could go wrong in this program. Also, floating-point (real number) calculations are notoriously hard to debug, as it's hard to see exactly where something went wrong. Do your best! If you get completely stuck, consult your teacher's solution.

***Help! I can't math.***

You are strong encouraged to figure out this lab on your own; however, if you get stuck with the math / physics, here are some overly helpful [hints](https://www.dropbox.com/s/97g0d8pvn6ys5w0/NBodySimulations%20help.docx?dl=0).