Problem 2: Threads synchronization and communication

A1 = 500 * (500 + 1)/2 = 125250

B1 = 250 * (250 + 1)/2 = 31375

B2 = A1 + [200 * (200 + 1)/2] = 145350

A2 = B2 + [300 * (300 + 1)/2] = 190500

B3 = A2 + [400 * (400 + 1)/2] = 270700

A3 = B3 + [400 * (400 + 1)/2] = 350900

In the code, join() are used for both threads to allow them to wait for each other to execute. This is used within the for loop, as given:

```
public static void main(String[] args) throws InterruptedException {
    int testSize = 5;

    Data mySample = new Data();

    for (int i = 0; i<testSize; i++) {
        System.out.println("\n\nThis is iteration #" + (i+1) + "\n");

        mySample.goFunA2 = false;
        mySample.goFunB2 = false;
        mySample.goFunA3 = false;
        mySample.goFunB3 = false;

        ThreadA ta = new ThreadA(mySample);
        ThreadB tb = new ThreadB(mySample);

        ta.start();
        tb.start();

        ta.join();
        tb.join();
    }

}
```

In the code of the threads themselves, a while(goFun__ == false) block is used to allow the synchronized portion of the thread to thread.wait() for a notification from the other thread, as given:

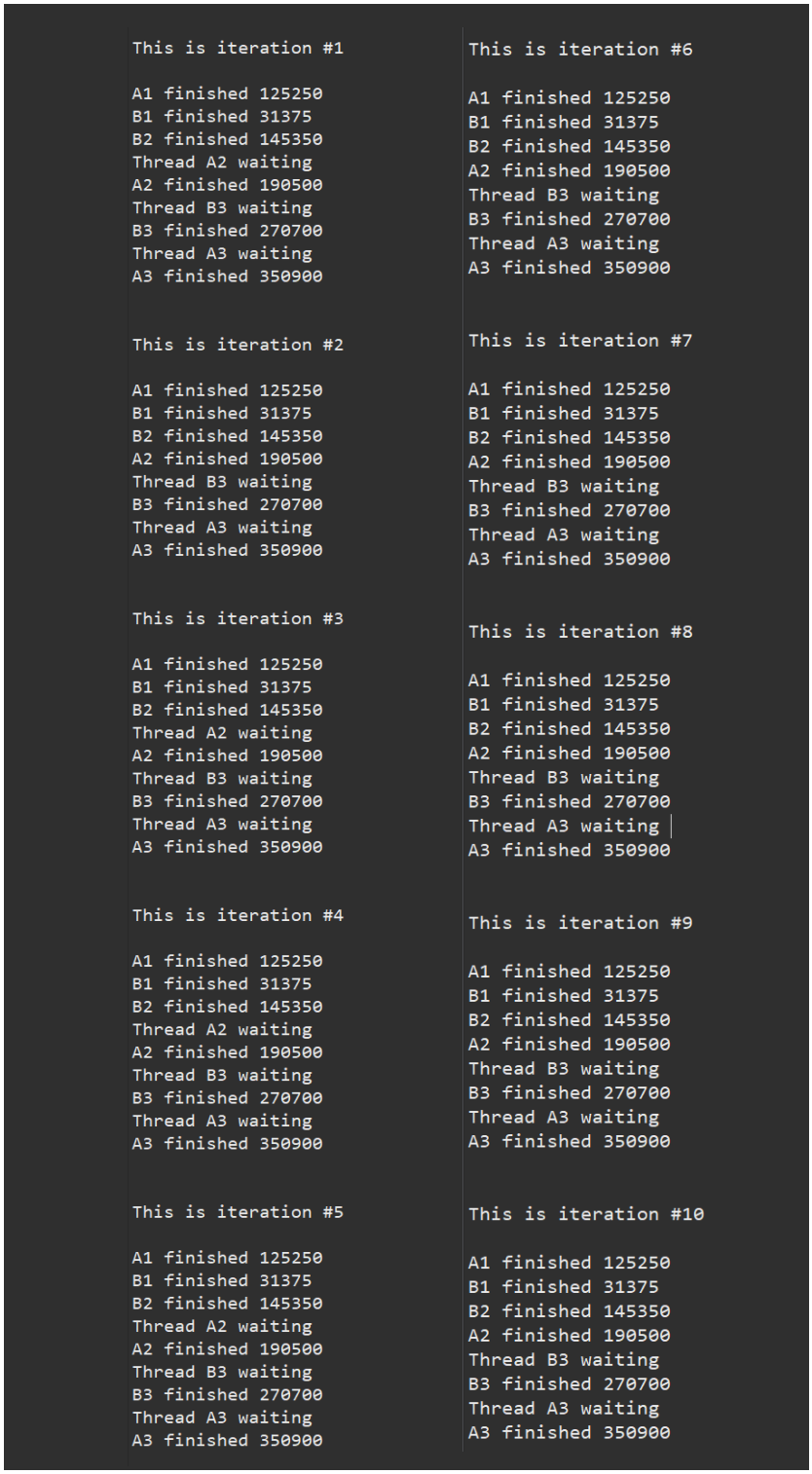
```
synchronized(sample) {
    try {
        while (sample.goFunA2 == false) {
            sample.wait();
            System.out.println("Thread A2 waiting ");
        }

        int n = 300;
        sample.A2 = sample.B2 + n*(n+1)/2;
        System.out.println("A2 finished " + sample.A2);
        sample.goFunB3 = true;
        sample.notify();

    } catch (InterruptedException e) {
        e.printStackTrace();
    }
}
```

This avoids using thread.sleep().

The resulting code, when done in 5 iterations to verify how correct the implementation is, gives the following results:



In all of the iterations, all values match the calculated values in the correct orders.