1. The code compiles and runs successfully. The Excel for part A is in the folder.
2. **Comparing Different Batches:**

In this part, I tested 4 batches for both Call and Put option, and plotted them all together in a single graph, as I think that this may be more intuitive. The data we cared about (the ones that have the exact results in the homework pdf) are marked by a blue shade. The parameters I used in this part are: J = 200, N = 150,000. All share a same SMax = 400, which is the largest stock price we tested on. This way the plot will be more consistent. For both batch1 and Batch2, the results are very accurate(almost the same as the exact value). For Batch3, since we do not have S = 5 in the label, we look at S = 4 & S = 6. This exact value falls in range between S = 4 and S = 6 as well. However, for batch4, the result is not that accurate, but reasonably enough. In specific, we got 97.72 as the simulated Call Value (actual = 92.175) and 1.149 as the simulate Put Value (actual = 1.247). This may be due to the large T in batch4. I discovered that only when we use reasonably large N, which is a large number of time steps, we can make batch4 to have values. Otherwise it may diverge. This indicates that convergence is not guaranteed in Finite Difference Method. Nevertheless, when the solution is indeed stable, the accuracy is relatively high, as we observe that the simulated price in Batch1, Batch2, and Batch3 are almost the same as the exact solution, and Batch4 got pretty close to the exact solution as well.

**Comparing Different N (number of time steps) and J (number of space/stock steps)**

In this part, I used Batch1 and compared different values of J with N = 1000, 10,000, and 100,000. Parameters: Type = Call, T = 0.25, boundary SMax = 200 for all cases. The reason I chose this SMax value is because this will generate a step when S is exactly 60, which makes it easier to compare with the exact value given in the pdf. I plotted separated graphs for J = 30, 100, 250, and 330, respectively, all in one Excel. Each graph has a fixed J value has 3 different N values for comparison.

Starting with **J = 30**: Since the steps in stock prices is small, and it satisfies the stability condition delta ΔT = O(ΔX^2) for all N, there is no oscillation or divergence showing up. However, due to the small space steps, the value simulate is not very accurate, which is only 2.11 for all N, where the actual exact value is 2.133.

**J = 100**: Now that the number of space steps are larger, we do get a more accurate result than when J is 30. We end up with 2.134 for all N. Since J = 100 satisfies ΔT = O(ΔX^2) for all N, we do not observe any divergence.

**J = 250**: Now we observe that when N = 1000, the values start to oscillate and we do not get a converged solution. This is because the condition of stability is not satisfied anymore, where J gets large and N is not large enough to be greater than J^2. In comparison, when N = 10,000 and 100,000, the simulate values are 2.132 for both cases, which is accurate enough compared to the exact value.

**J = 300**: Now we still observe when N = 1000, the solution does not converge. This is because J = 300 is too large when N = 1000, which violates the stability condition. And since Finite Difference Method converges if and only if stability condition is satisfied, in the case of J = 300 and N = 1000, it does not converge. In comparison, when N = 10,000 and 100,000, the value does converge. When we look at the option value when S = 60, we observe the simulated value gets closer to the exact value, where they both equals to 2.133, which is the same as the exact value. This is because we took larger space steps while satisfying the stability condition, so we got a more accurate result.