In this experiment, I have noticed how does the Initialization of Temperature, Cooling constance, Length of Epoch and the Mutation range effect the result of the Simulated Annealing Algorithm. First of all, here we have three kinds of mutation methods in this experiment. Each mutation methods gives different range, the table shows the range of each mutation method gives(by looping 10000 times).

	Uniform	Normal	Cauchy
Maximum	0.098834	0.386909	1925.78
Minimum	-0.093483	-0.444568	-281.902

Notice that this table is just a test of the range of each mutation method, in the real program, the mutated x and y will be in [-100, 100]. If the mutated x and y out of the range, it will regenerate a new mutation value again until it's acceptable. This shows Uniform mutation gives very small change, and the Cauchy is really thick change. I've tested these 3 mutation method with start Temperature 100 and the Cooling Constance 0.9, Epoch Length 10, the best fitness found is:

T: 100 / C: 0.9	Uniform	Normal	Cauchy
Best Fitness	2.84055	4.52349	5.03612

Here we can see these three mutation methods give different exploration abilities, and obviously Uniform Mutation doesn't give enough change for the x and y, so it got stuck at the local maxima. Normal mutation works better, but still not perfect in this temperature. Cauchy mutation looks great, but the range it change is too huge sometimes, so the program need to spend more resources to control the mutated x and y be in [-100, 100].

Then I start to adjust the starting temperature. I noticed that Temp will decide the probability of the acceptation in this algorithm and the cooling constance will effect how fast the temp changes, a larger number makes it change slower. It means, lower temperature may give a higher probability to check the "Bad Moves". And if I set up the start Temp as negative number, the algorithm will accept all of the evaluations(But this can help finding better fitness).

T: 5 / C: 0.9	Uniform	Normal	Cauchy
Best Fitness	4.14946	5.03612	5.03612

To conclusive, in the Simulated Annealing Algorithm, it’s important to analyze the Problem first, so we can know what kind of mutation method we should use. The Temp and Cooling are important for the probability of algorithm’s bad moves acceptation, that is, try bad moves, but as worse it has, a lower probability it accepts.