

Result:

Question 1.b.

```
enter number [1-3] to run , exit when enter number is [0]
1: run 3.1
2: run 3.2
3: run 3.2c
1
American Call option price under binomial model:3.74639
American Put option price under binomial model:1.27643
American Strangle option price under binomial model:4.89819
```

Question 2.c.

Using normal distribution generator in part (b)

```
enter number [1-3] to run , exit when enter number is [0]
1: run 3.1
2: run 3.2
3: run 3.2c
3
E[stopping time]: 58.4718
Standard deviation of stopping time: 51.9342
The 95% confidence interval is [-43.3193, 160.263].
=====
```

Using normal_distribution in <random>

```
enter number [1-3] to run , exit when enter number is [0]
1: run 3.1
2: run 3.2
3: run 3.2c
2
E[stopping time]: 58.7698
Standard deviation of stopping time: 51.8737
The 95% confidence interval is [-42.9027, 160.442].
=====
```

Unit Test Result:

```
Working directory: '/Users/zihanxu/workspace/c++/cpp-base/task3'
1 arguments:
argv[0] = '/Users/zihanxu/workspace/c++/cpp-base/task3/build/main.out'
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:19: PASSED: obj != __null for: 0x000000001004002d0 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:33: PASSED: obj != __null for: 0x00000000100404920 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:38: PASSED: result == "0.223144" for: "0.223144" == "0.223144"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:44: PASSED: obj != __null for: 0x00000000100600420 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:49: PASSED: result == "0.693147" for: "0.693147" == "0.693147"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:55: PASSED: obj != __null for: 0x00000000100600140 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:60: PASSED: result == "0.693147" for: "0.693147" == "0.693147"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:66: PASSED: obj != __null for: 0x00000000100600410 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:73: PASSED: result == "0.1" for: "0.1" == "0.1"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:79: PASSED: obj != __null for: 0x000000001004058b0 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:82: PASSED: tmp == 0 for: 0.0 == 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:87: PASSED: obj != __null for: 0x00000000100407630 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:95: PASSED: lower == "-1.96" for: "-1.96" == "-1.96"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:96: PASSED: upper == "1.96" for: "1.96" == "1.96"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:107: PASSED: obj != __null for: 0x000000001004057f0 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:117: PASSED: result == "0.1" for: "0.1" == "0.1"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:107: PASSED: obj != __null for: 0x00000000100402640 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:124: PASSED: tmp == 0 for: 0.0 == 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:107: PASSED: obj != __null for: 0x00000000100700000 != 0
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:136: PASSED: lower == "-1.96" for: "-1.96" == "-1.96"
/Users/zihanxu/workspace/c++/cpp-base/task3/main.cpp:137: PASSED: upper == "1.96" for: "1.96" == "1.96"
Passed all 3 test cases with 21 assertions.
```