```
Number of chopsticks: 5
The average wait time to eat for each philosopher is:
Philosopher 1: 1.000019
Philosopher 2: 0.000001
Philosopher 3: 2.664704
Philosopher 4: 1.666697
Philosopher 5: 1.665976
The average wait time to eat for all philosopher is: 1.399479

Number of chopsticks: 5
The average wait time to eat for each philosopher is:
Philosopher 1: 1.333351
Philosopher 2: 2.998775
Philosopher 3: 0.999534
Philosopher 4: 1.998309
Philosopher 5: 0.666649
The average wait time to eat for all philosopher is: 1.599324

Number of chopsticks: 5
The average wait time to eat for each philosopher is:
Philosopher 1: 1.332681
Philosopher 2: 0.999843
Philosopher 3: 2.333297
Philosopher 4: 1.000087
Philosopher 5: 1.333444
The average wait time to eat for all philosopher is: 1.399871

Number of chopsticks: 5
The average wait time to eat for each philosopher is:
Philosopher 1: 2.666540
Philosopher 2: 0.666566
Philosopher 3: 0.000000
Philosopher 4: 0.666505
Philosopher 5: 0.999992
The average wait time to eat for all philosopher is: 0.999921

Number of chopsticks: 5
The average wait time to eat for each philosopher is:
Philosopher 1: 0.999992
Philosopher 2: 1.999663
Philosopher 3: 1.999931
Philosopher 4: 0.333293
Philosopher 5: 0.999005
The average wait time to eat for all philosopher is: 1.266377
```

	Run 1 average	Run 2 average	Run 3 average	Run 4 average	Run 5 average	All runs average
Philosopher 1	1.000019	1.333351	1.332681	2.666540	0.999992	1.466517
Philosopher 2	0.000001	2.998775	0.999843	0.666566	1.999663	1.332970
Philosopher 3	2.664704	0.999534	2.333297	0.000000	1.999931	1.599493
Philosopher 4	1.666697	1.998309	1.000087	0.666505	0.333293	1.132978
Philosopher 5	1.665976	0.666649	1.333444	0.999992	0.999005	1.133013
Total	1.399479	1.599324	1.399871	0.999921	1.266377	1.332994

With the waiter having 5 chopsticks between 5 philosophers. We can see philosophers have higher waiting times if they place lower in the queue. Those who have a lower waiting time are because they are placed higher in the queue. With 5 chopsticks, at most 2 philosophers can eat at once; thus, those two philosophers will have a lower waiting time than the rest in each run, which is evident in the table above. The person last in the queue will have the highest waiting time. With 5 chopsticks, the average for all philosophers in all runs in 1.332994 seconds.

```
Number of chopsticks: 6
The average wait time to eat for each philosopher is:
Philosopher 1: 0.333326
Philosopher 2: 0.000000
Philosopher 3: 0.000001
Philosopher 4: 0.666279
Philosopher 5: 0.999902
The average wait time to eat for all philosopher is: 0.399901

Number of chopsticks: 6
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000001
Philosopher 2: 0.666643
Philosopher 3: 0.000000
Philosopher 4: 0.999784
Philosopher 5: 1.333087
The average wait time to eat for all philosopher is: 0.599903

Number of chopsticks: 6
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000002
Philosopher 2: 0.000001
Philosopher 3: 0.000000
Philosopher 4: 1.332747
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.266550

Number of chopsticks: 6
The average wait time to eat for each philosopher is:
Philosopher 1: 0.333275
Philosopher 2: 1.332950
Philosopher 3: 0.000001
Philosopher 4: 0.333291
Philosopher 5: 0.000002
The average wait time to eat for all philosopher is: 0.399904

Number of chopsticks: 6
The average wait time to eat for each philosopher is:
Philosopher 1: 0.666249
Philosopher 2: 0.333276
Philosopher 3: 0.999608
Philosopher 4: 0.000000
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.399827
```

	Run 1 average	Run 2 average	Run 3 average	Run 4 average	Run 5 average	All runs average
Philosopher 1	0.333326	0.000001	0.000002	0.333275	0.666249	0.266571
Philosopher 2	0.000000	0.666643	0.000001	1.332950	0.333276	0.466574
Philosopher 3	0.000001	0.000000	0.000000	0.000001	0.999608	0.199922
Philosopher 4	0.666279	0.999784	1.332747	0.333291	0.000000	0.666420
Philosopher 5	0.999902	1.333087	0.000000	0.000002	0.000000	0.466598
Total	0.399901	0.599903	0.266550	0.399904	0.399827	0.413217

With the waiter having 6 chopsticks, we can have 3 philosophers eat at once and we can see that through the waiting times. In the table above, we see that in each run, three philosophers will have lower waiting times than the other two with significantly higher times as they will have to wait for whoever the first philosopher is to return their chopsticks. Although we have this bottleneck, adding another chopstick makes the wait times significantly less. With 6 chopsticks, the average for all philosophers in all runs in 0.413217 seconds.

```
Number of chopsticks: 7
The average wait time to eat for each philosopher is:
Philosopher 1: 1.666450
Philosopher 2: 0.000000
Philosopher 3: 0.000000
Philosopher 4: 0.000001
Philosopher 5: 0.000002
The average wait time to eat for all philosopher is: 0.333291

Number of chopsticks: 7
The average wait time to eat for each philosopher is:
Philosopher 1: 0.333294
Philosopher 2: 0.666782
Philosopher 3: 0.000001
Philosopher 4: 0.000000
Philosopher 5: 1.000114
The average wait time to eat for all philosopher is: 0.400038

Number of chopsticks: 7
The average wait time to eat for each philosopher is:
Philosopher 1: 1.332595
Philosopher 2: 0.000002
Philosopher 3: 0.000001
Philosopher 4: 1.000068
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.466533

Number of chopsticks: 7
The average wait time to eat for each philosopher is:
Philosopher 1: 0.333079
Philosopher 2: 1.000042
Philosopher 3: 0.000001
Philosopher 4: 0.333086
Philosopher 5: 0.999934
The average wait time to eat for all philosopher is: 0.533228

Number of chopsticks: 7
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000000
Philosopher 2: 0.000001
Philosopher 3: 1.332486
Philosopher 4: 0.333268
Philosopher 5: 0.333384
The average wait time to eat for all philosopher is: 0.399828
```

	Run 1 average	Run 2 average	Run 3 average	Run 4 average	Run 5 average	All runs average
Philosopher 1	1.666450	0.333294	1.332595	0.333079	0.000000	0.733084
Philosopher 2	0.000000	0.666782	0.000002	1.000042	0.000001	0.333365
Philosopher 3	0.000000	0.000001	0.000001	0.000001	1.332486	0.266498
Philosopher 4	0.000001	0.000000	1.000068	0.333086	0.333268	0.333285
Philosopher 5	0.000002	1.000114	0.000001	0.999934	0.333384	0.466687
Total	0.333291	0.400038	0.466533	0.533228	0.399828	0.426584

With 7 chopsticks, the results will be similar to having 6. This is primarily because having the extra chopstick doesnt change how many philosophers can eat at once, and it is still only three philosophers. We still that 3 philosophers will have lower waiting times. The only thing that having 7 chopsticks changes is that a fourth philosopher can hold left chopsticks and just wait for a chopstick to be free instead of 2. We see this through a single philosopher having slightly decreased wait times along with the three who have lower waiting times. With 7 chopsticks, the average for all philosophers in all runs in 0.426584 seconds.

```
Number of chopsticks: 8
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000001
Philosopher 2: 0.000001
Philosopher 3: 0.666374
Philosopher 4: 0.000002
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.133276

Number of chopsticks: 8
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000001
Philosopher 2: 0.333428
Philosopher 3: 0.000002
Philosopher 4: 0.000001
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.066686

Number of chopsticks: 8
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000000
Philosopher 2: 0.000000
Philosopher 3: 0.000001
Philosopher 4: 0.000000
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 8
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000000
Philosopher 2: 0.000000
Philosopher 3: 0.000000
Philosopher 4: 0.000001
Philosopher 5: 0.000002
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 8
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000002
Philosopher 2: 0.000000
Philosopher 3: 0.000000
Philosopher 4: 0.000001
Philosopher 5: 0.333176
The average wait time to eat for all philosopher is: 0.066636
```

	Run 1 average	Run 2 average	Run 3 average	Run 4 average	Run 5 average	All runs average
Philosopher 1	0.000001	0.000001	0.000000	0.000000	0.000002	0.000001
Philosopher 2	0.000001	0.333428	0.000000	0.000000	0.000000	0.066686
Philosopher 3	0.666374	0.000002	0.000001	0.000000	0.000000	0.133275
Philosopher 4	0.000002	0.000000	0.000000	0.000001	0.000001	0.000001
Philosopher 5	0.000001	0.000001	0.000001	0.000002	0.333176	0.066636
Total	0.133276	0.066686	0.000001	0.000001	0.066636	0.053320

With 8 chopsticks, we can see a significant decrease in waiting times and due to the way the program was implemented, all philosophers will have low waiting times as 4 philosophers can eat at once and when one philosopher finishes the 5 can start eating almost right away since they are the only person in queue. Because of the main thread randomly choosing philosophers, there can be the odd case were a philosopher is not chosen for more time than other philosophers. With 8 chopsticks, the average for all philosophers in all runs in 0.053320 seconds.

```
Number of chopsticks: 9
The average wait time to eat for each philosopher is:
Philosopher 1: 0.332960
Philosopher 2: 0.000000
Philosopher 3: 0.000001
Philosopher 4: 0.000000
Philosopher 5: 0.000002
The average wait time to eat for all philosopher is: 0.066593

Number of chopsticks: 9
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000000
Philosopher 2: 0.000001
Philosopher 3: 0.000001
Philosopher 4: 0.000002
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 9
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000000
Philosopher 2: 0.000001
Philosopher 3: 0.000000
Philosopher 4: 0.000001
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 9
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000001
Philosopher 2: 0.000001
Philosopher 3: 0.000000
Philosopher 4: 0.000000
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 9
The average wait time to eat for each philosopher is:
Philosopher 1: 0.332979
Philosopher 2: 0.000000
Philosopher 3: 0.000000
Philosopher 4: 0.000000
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.066596
```

	Run 1 average	Run 2 average	Run 3 average	Run 4 average	Run 5 average	All runs average
Philosopher 1	0.332960	0.000000	0.000000	0.000001	0.332979	0.133188
Philosopher 2	0.000000	0.000001	0.000001	0.000001	0.000000	0.000001
Philosopher 3	0.000001	0.000001	0.000000	0.000000	0.000000	0.000001
Philosopher 4	0.000000	0.000002	0.000001	0.000000	0.000000	0.000001
Philosopher 5	0.000002	0.000000	0.000001	0.000000	0.000001	0.000001
Total	0.066593	0.000001	0.000001	0.000001	0.066596	0.026638

Having 9 chopsticks is a similar situation as having 7 because it doesn't how many philosophers can eat at only that an extra philosopher can hold a single chopstick until there is enough for them to take another one. Having 9 chopsticks will yield similar results as having 8 because at most 4 philosophers can eat at once. With 9 chopsticks, the average for all philosophers in all runs in 0.026638 seconds.

```
Number of chopsticks: 10
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000001
Philosopher 2: 0.000001
Philosopher 3: 0.000000
Philosopher 4: 0.000000
Philosopher 5: 0.000002
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 10
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000002
Philosopher 2: 0.000001
Philosopher 3: 0.000001
Philosopher 4: 0.000001
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 10
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000001
Philosopher 2: 0.000000
Philosopher 3: 0.000001
Philosopher 4: 0.000002
Philosopher 5: 0.000000
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 10
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000000
Philosopher 2: 0.000002
Philosopher 3: 0.000000
Philosopher 4: 0.000001
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.000001

Number of chopsticks: 10
The average wait time to eat for each philosopher is:
Philosopher 1: 0.000002
Philosopher 2: 0.000000
Philosopher 3: 0.000000
Philosopher 4: 0.000000
Philosopher 5: 0.000001
The average wait time to eat for all philosopher is: 0.000001
```

	Run 1 average	Run 2 average	Run 3 average	Run 4 average	Run 5 average	All runs average
Philosopher 1	0.000001	0.000002	0.000001	0.000000	0.000002	0.000001
Philosopher 2	0.000001	0.000001	0.000000	0.000002	0.000000	0.000001
Philosopher 3	0.000000	0.000001	0.000001	0.000000	0.000000	0.000000
Philosopher 4	0.000000	0.000001	0.000002	0.000001	0.000000	0.000001
Philosopher 5	0.000002	0.000000	0.000000	0.000001	0.000001	0.000001
Total	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001

Having 10 chopsticks will have no bottlenecks as every philosopher has their own set of chopsticks. As soon as one philosopher finishes eating, they will return their chopsticks. Still, since they can't eat again until all the philosophers have eaten, there will always be a set available for each philosopher. The philosopher can use the set they put back if they could eat without waiting. Because of this, there will be virtually no wait times. We can see the average for all philosophers in all runs in 0.000001 seconds.