

Please note that the results for the times were highly variable. Running with the same input several times often produced different results.

Question 1:

Program was implemented from pseudo-code provided and input was set to 30 60 as instructed. I measured minimum, maximum, and average wait times for both reader and writer. The following are the times:

```
The maximum wait time for writer is 0.000443
The maximum wait time for reader is 0.000239

The minimum wait time for writer is 0.000001
The minimum wait time for reader is 0.000000

The average wait time for writer is 0.000017
The average wait time for reader is 0.000012
```

This implementation does not seem to have a general starvation problem as seen from the average waiting time. However, a single thread can be starved for a while before being served as seen from the maximum waiting time.

Question 2:

Since there is no starvation, I tried different parameters and by trial and error I was able to get starvation. Using the input 1 10 the following times were found:

```
The maximum wait time for writer is 0.000124
The maximum wait time for reader is 0.000179

The minimum wait time for writer is 0.000002
The minimum wait time for reader is 0.000000

The average wait time for writer is 0.000031
The average wait time for reader is 0.000012
```

As shown above, there is a significant difference in average wait times and maximum wait times are still high hence with this input we have starvation

Question 3:

I modified the program to try and solve the starvation method. I tried the same input that caused starvation in question 2 and the result indicated that starvation was solved.

Question 4:

The average waiting times are almost similar, and the maximum wait time of the writer has decreased significantly meaning we solved the writer starvation problem.

```
The maximum wait time for writer is 0.000033
The maximum wait time for reader is 0.000124

The minimum wait time for writer is 0.000001
The minimum wait time for reader is 0.000000

The average wait time for writer is 0.000012
The average wait time for reader is 0.000011
```