COMP9334 Revision Questions for Week 8 (Solution)

Question 1

(a) A program that implements the transient removal procedure in Section 9.5.1 Law and Kelton can be found in `week08_q1_a.m` (matlab file). You can vary the value of w. You should adjust w until you get a smoothed curve. There are no hard rules are to how to choose w. This is done by trial-and-error.

We start with $w = 10$. The result is plotted in the Figure 1. You see a lot of oscillation in the graph so we will need to increase the value of w to smooth it out.

Let us try $w = 100$. The result is plotted in Figure 2. The graph is still oscillatory but less.

Let us try $w = 500$. The result is plotted in Figure 3. The graph is a smoother but it still oscillates. It is difficult to get the ideal shape where the graph rises up initially and then settles down to a steady state value. From Figure 3, you can see that the curve oscillates around a value of 3.3. That is probably the mean value. Based on that, the suggestion is to cut away the first 1000 points.

(b) Since we have decided to take the first 1000 data points as the transient. For each replication, we compute the mean over 19000 data points (i.e. from data point 1001 to 20,000). The mean response times given by the 5 replications are: 3.488, 3.3309, 3.2025, 3.3242 and 3.2356.

The sample mean and sample standard deviation are calculated to be, respectively, 3.3163 and 0.1110. Since there are 5 replications, to compute the 90% confidence interval, we need to the value of $t_{4,0.95}$ which is 2.132. The 90% confidence interval is therefore $3.3163 \pm 2.132 \frac{0.1110}{\sqrt{5}} = [3.2105, 3.4221]$.

Some of these calculations can be found in the file `week08_q1_b.m`

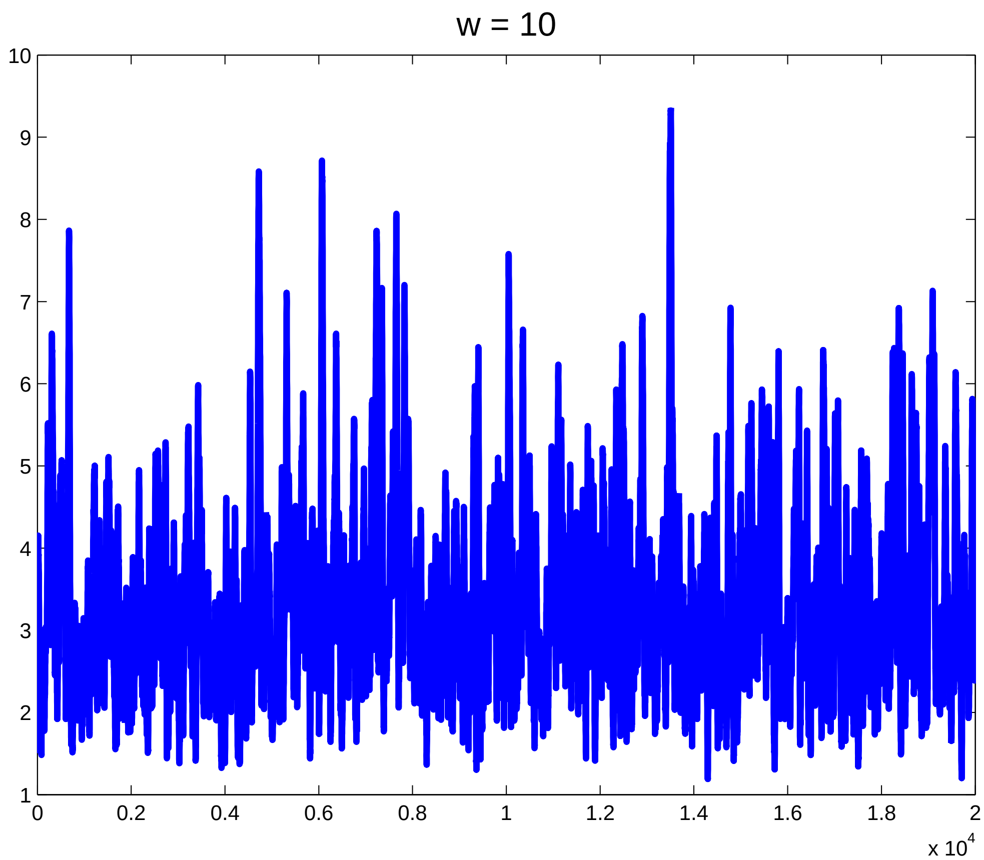

Figure 1: Question 1a. $w = 10$

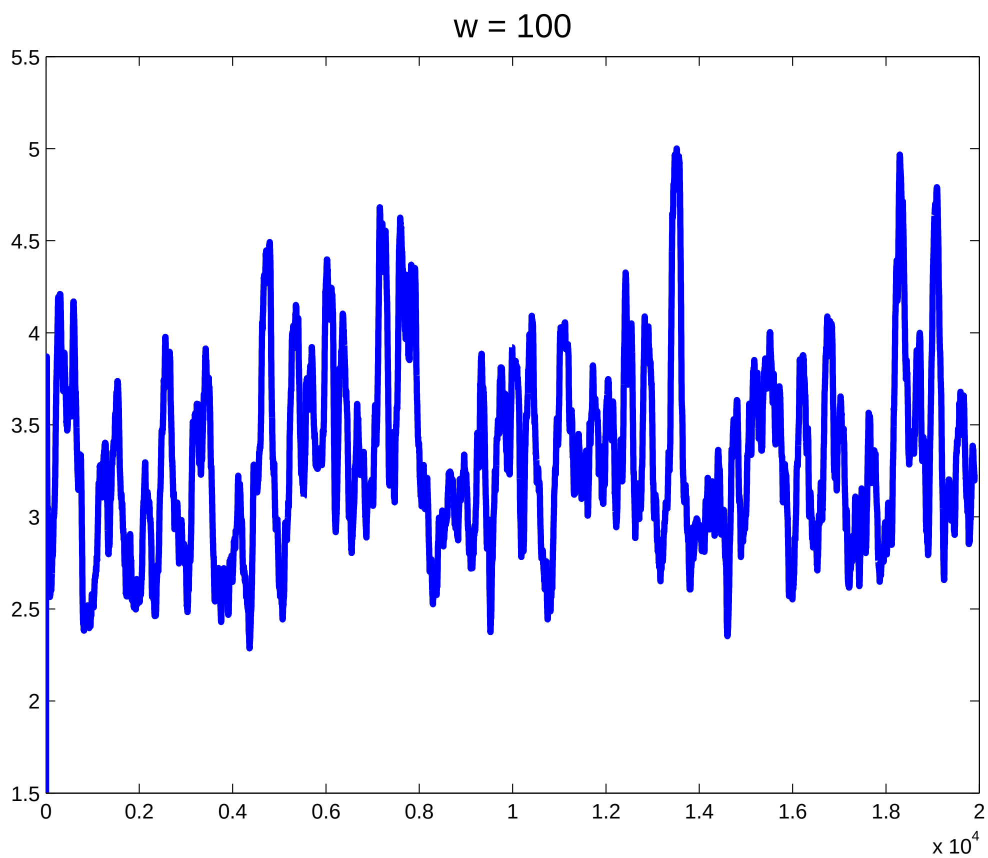

Figure 2: Question 1a. $w = 100$

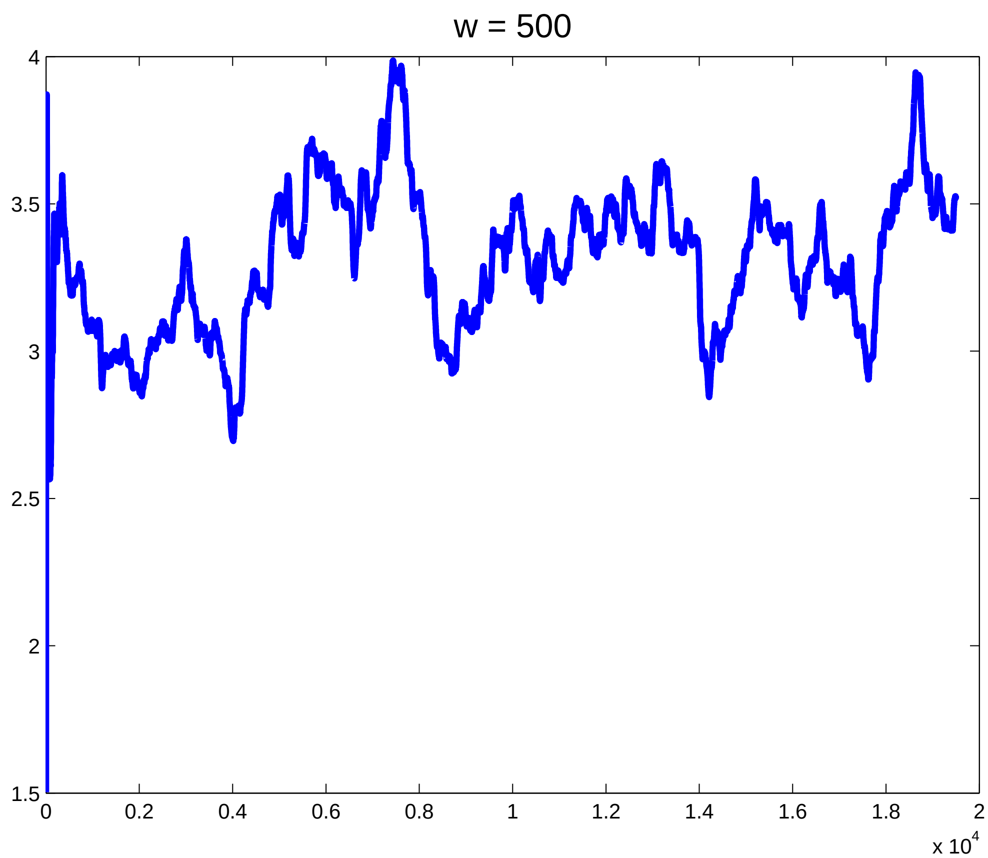

Figure 3: Question 1a. $w = 500$

Question 2

Let us first compare Systems 1 and 2. The mean response time of System 1 minus mean response time of System 2, over 5 replications, are 0.86, -0.89, 0.26, -2.31, 1.83. The sample mean and sample standard deviation are, respectively, -0.05 and 1.6025. The 95% confidence interval is $-0.05 \pm t_{4,0.0975} \frac{1.6025}{\sqrt{5}} = [-2.0397, 1.9397]$. Thus we can not determine whether System 1 is better or worse than System 2. (Note: $t_{4,0.0975} = 2.7764$)

Consider the difference: mean response time of System 1 minus mean response time of System 3, we find the 95% confidence interval for this difference is $[-1.4356, 2.3716]$, thus we cannot conclude whether System 1 is better or worst than System 3.

Consider the difference: mean response time of System 2 minus mean response time of System 3, we find the 95% confidence interval for this difference is $[0.3266, 0.7094]$, thus we can conclude System 3 is better than System 2 with 95% confidence.

We can only conclude that System 3 is better than System 2 with 95% confidence. However, we cannot say with 95% confidence which system is the best out of the three.