

3. Estimated RTT.

Consider the TCP procedure for estimating RTT. Let $EstimatedRTT_0 = 100$ ms be the estimated RTT when a TCP is initialised. Then, the TCP sender receives 5 ACKs and sample RTTs are measured as $SampleRTT_1$, $SampleRTT_2$, $SampleRTT_3$, $SampleRTT_4$, and $SampleRTT_5$. All of them are 110 ms. Let $EstimatedRTT_i$ denote the estimated RTT right after the i th ACK. We assume $\alpha = 0.125$ in this question.

- (1) Calculate $EstimatedRTT_4$ and $EstimatedRTT_5$.
- (2) Generalise your solution to n sample RTTs. The TCP sender receives n ACKs, with i th sample RTT $SampleRTT_i$. We assume all $SampleRTT_i$ are 110 ms. Express $EstimatedRTT_n$ as a function of n .
- (3) For the formula in part (2), let n approach infinity. What is $EstimatedRTT_n$? Comment on why this averaging procedure is called an exponential moving average.