

EECS-863 Analysis of Communication Networks

Spring Semester 2008

Assignment #7 Due **11 March 2008**

Reading (Hayes/Babu): sections 9.1, 9.3

Supplemental Reading: Class notes

1. Using notation from the class notes, and assuming that the random variables $\{X_i\}$ are independent and identically distributed (iid), show that $\hat{\sigma}^2(n)$ is an unbiased estimator of σ^2 , the variance of the $\{X_i\}$. That is, show that the mean of $\hat{\sigma}^2(n)$ is σ^2 .
2. On the course website, you will find two text files of results corresponding to a portion of your Project 1. Specifically, the first file (proj1.100.runs.txt) contains the mean packet delays from a set of 100 simulation runs, each of which was run for approximately 4000 packet generation times with a run-in period corresponding to approximately 2000 packet run-in times (this corresponds to part 3a of Project 1). The second file (proj1.40.runs.txt) contains the mean packet delays from a set of 40 simulation runs, each of which was run for approximately 10,000 packet generation times with a run-in period corresponding to approximately 2000 packet run-in times (this corresponds to part 3c of Project 1). Calculate the point estimate for mean packet delay, 90% confidence interval, and 95% confidence interval for each set of data. You may use Excel to calculate mean and variance estimates for each set of data, but show all other work on your homework paper. In this particular case, which of the two experiments produced the best estimator? Note that I am not asking which point estimator was closer to the theoretical value (which you typically do not know from a simulation experiment), but rather: which experiment had the smaller confidence interval width?