

## Homework 2: Due Wednesday, February 9

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1. The following are weights of individual pieces of chocolate.  
11.8, 22, 48.6, 22.3, 37.9, 29.6, 69.5, 42.5, 74, 25.9  
Find estimates for the average weight and the standard deviation of the chocolate weights. Assuming that the weights follow a normal distribution, find a 95% confidence interval for the average weight, and a 95% prediction interval for a new observation.
2. Find a confidence interval for the difference between the two means and the ratio of the two variances of the following samples:  
Sample 1: 27, 31, 42, 37, 40, 43, 33, 32, 28, 29, 30, 32, 36, 41, 40, 39, 36, 32, 33, 33.  
Sample 2: 35, 32, 39, 44, 43, 40, 29, 38, 35, 37.  
It may be assumed that the populations are normally distributed.
3. Consider the random variable  $X$  having pdf  $f(x|\theta) = \theta e^{-x} + 2(1-\theta)e^{-2x}$  for  $x > 0$ 
  - (a) If a random sample of  $n$  observations is obtained on  $X$ , find the MM estimator of  $\theta$ . Using a suitable normal approximation (for large  $n$ ) find a 95% confidence interval for  $\theta$  based on  $\bar{X}$ .
  - (b) Write down the likelihood function for a sample of  $n$  observations.
4. For sampling on  $X \stackrel{d}{=} \text{Pn}(\lambda)$  show that  $\bar{X}$  and  $S^2$  are both unbiased estimators for  $\lambda$  but  $\bar{X}$  is more efficient.
5. Problems from the textbook: 4.1.3, 4.2.11, 4.2.17, 4.2.21, 4.2.25, 6.1.2