Practice questions

1. The measurements of ten random athlete heights in centimeters are

$$152, 163, 188, 201, 192, 176, 194, 166, 215, 184.$$

   (a) Assuming the heights are independent normal random variables with known standard deviation $\sigma = 20$, give a 95% confidence interval for the mean height.

   (b) How many samples do you need for a 95% confidence interval of width 5cm?

2. A large company conducts a job satisfaction survey among its 6250 employees. Out of 250 employees that are sampled (with repetition), 142 are satisfied with their jobs.

   (a) Calculate a 99% confidence interval for the number of employees that are satisfied with their job.

   (b) Find a confidence interval of width 100 for the number of satisfied employees and estimate the confidence level for it.

3. The midterm test scores of six random students are 81, 84 ,83, 73, 76, 83.

   (a) What is the sample variance?

   (b) Assuming their scores are independent Normal(μ, σ) random variables. Give as large a value for $\hat{\Theta}_-$ as you can so that $(\hat{\Theta}_-, 10)$ is a 95% confidence interval for σ.

4. A food processing company packages honey in glass jars. The volume of honey in millilitre in a random jar is a Normal(μ, σ) random variable. 5 random jars are picked and the volume of honey inside them in millilitre are 108, 101, 103, 109 and 104.

   (a) Suppose μ is unknown and σ is known to be 5. Give a 95% confidence interval for μ.

   (b) Suppose μ and σ are both unknown. Give a 95% confidence interval for μ.

   (c) Suppose μ and σ are both unknown. Give a 95% prediction interval for the next sample.