Statistics for laboratory scientists

Homework problems for lecture 14

1. Suppose I measure some treatment response on a set of 10 mice from strain A, and receive the following data:

   84 106 99 101 100

   99 127 105 101 108

   Note that n=**10**, the sample mean is **103** and the sample SD is **10.67**.

   Suppose I measure the same sort of treatment response on a set of 5 mice from strain B, and receive the following data:

   56 62 67 81 69

   Note that m=**5**, the sample mean is **67** and the sample SD is **9.30**.

   Calculate a 95% confidence interval for the difference in the average treatment responses of strains A and B.

2. Suppose I measure some treatment response on a set of 6 mice from a particular strain, and receive the following data:

   107 101 93 94 96 114

   Note that the sample mean is 100.83 and the sample SD is 8.28.

   Imagine that the data are independent draws from some normal distribution.

   a. **Calculate a 95% confidence interval for the population mean.**

   b. **Calculate a 95% confidence interval for the population SD.** (Note that the the 2.5 and 97.5 percentiles of the chi-square distribution with 5 degrees of freedom are 0.8312 and 12.83, respectively.

3. Consider data on the treatment response of 12 mice from strain A and 9 mice from strain B.

Strain A:	132 72 102 115 59 103	sample mean = **96.58**
	86 159 60 94 80 97	sample SD = **29.09**
Strain B:	101 96 93 106 81 77	sample mean = **92.33**
	106 97 74	sample SD = **12.17**

Assume that the measurements from strain A are independent draws from a normal distribution with mean mu_A and SD $sigma_A$, and that the the measurements from strain B are independent draws from a normal distribution with mean mu_B and SD $sigma_B$.

Calculate an approximate 95% confidence interval for the difference between the strain means, allowing for the possibility that the two strains have different SDs.

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