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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 μ_A and SD σ_A , and that the the measurements from strain B are independent draws from a normal distribution with mean μ_B and SD σ_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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Last modified: Wed Feb 22 09:43:29
EST 2006