

This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike License](https://creativecommons.org/licenses/by-nc-sa/4.0/). Your use of this material constitutes acceptance of that license and the conditions of use of materials on this site.



Copyright 2006, The Johns Hopkins University and Karl Broman. All rights reserved. Use of these materials permitted only in accordance with license rights granted. Materials provided "AS IS"; no representations or warranties provided. User assumes all responsibility for use, and all liability related thereto, and must independently review all materials for accuracy and efficacy. May contain materials owned by others. User is responsible for obtaining permissions for use from third parties as needed.

## Statistics for laboratory scientists

### Homework problems for lecture 16

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

<b>Strain A:</b>	55.2 58.1 41.7 44.9 44.8 48.9	sample mean =	<b>48.15</b>
	47.5 48.1 48.4 51.6 40.6 48.0	sample SD =	<b>5.06</b>
<b>Strain B:</b>	48.7 52.6 65.2 70.4 44.2 54.7	sample mean =	<b>55.90</b>
	44.0 66.5 56.8	sample SD =	<b>9.70</b>

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  $\sigma_B$ .

**Test the hypothesis  $H_0: \mu_A = \mu_B$  versus the alternative  $H_a: \mu_A \neq \mu_B$ .** (By " $\neq$ ", I mean "not equal to".).

- a. Calculate the P-value for the test.
  - b. What do you conclude?
2. Repeat the above problem for the one-tailed test of  $H_0: \mu_A = \mu_B$  versus the alternative  $H_a: \mu_A < \mu_B$
  3. Consider data for some measurement on 6 mice before and after some treatment.

<b>Mouse</b>	1	2	3	4	5	6
<b>Before</b>	81	101	76	67	125	144

<b>After</b>	138	210	162	105	259	319
<b>Difference</b>	57	109	86	38	134	175

Does the treatment have an effect? Assume that the differences are independent draws from a normal distribution with mean  $\mu$  and SD  $\sigma$ .

**Test the hypothesis  $H_0: \mu = 0$  versus the alternative  $H_a: \mu \neq 0$ .**

- a. Calculate the P-value for the test.
- b. What do you conclude?

---

[ [3rd term syllabus](#) | [4rd term syllabus](#) | [R for Windows](#) ]

Last modified: Sun Feb 26 00:14:08  
EST 2006