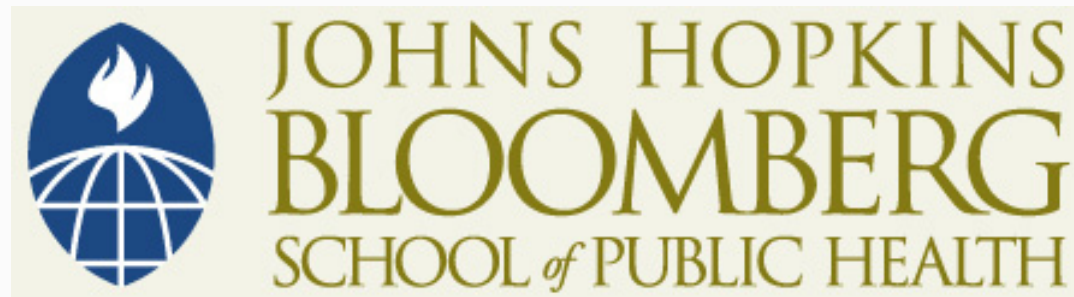


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## Lecture 4c: Practice Problems

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## Practice: Paired t-test

1. Eight counties were selected from State A
  - Each of these counties was matched with a county from State B, based on the following factors:
    - ▶ Mean income
    - ▶ Percentage of residents living below the poverty level
    - ▶ Violent crime rate
    - ▶ Infant Mortality Rate (IMR) in 2006
    - ▶ Information on the infant mortality rate in 2007 was collected on each set of eight counties
    - ▶ IMR is measured in deaths per 10,000 live births
    - ▶ A pre- and post-neonatal care program was implemented in State B at the beginning of 2007

## Practice: Paired t-test

1. This data is being used to compare the IMR rates in States A and B in 1997
  - This comparison will be used as part of the evaluation of the neonatal care program in State B, regarding its effectiveness on reducing infant mortality

## Practice: Paired t-test

1. The data is as follows:

Pair	IMR: State A	IMR: State B	Difference (A - B)
1	80	76	4
2	130	112	18
3	88	97	-9
4	98	67	31
5	103	107	-4
6	121	116	5
7	83	94	-11
8	93	78	15
<b>Mean</b>	99.5	93.4	6.1
<b>SD</b>	17.9	18.1	14.5

## Practice: Paired t-test

1. What is the appropriate method for testing whether the mean IMR is the same for both states in 2007?
  - Estimate a 95% confidence for the true difference in mean IMR between the two state groupings
  - State your null and alternative hypotheses for the corresponding hypothesis test
  - Report a p-value for the hypothesis test
  - Do the results from the 95% confidence level and the p-value agree in terms of the null hypothesis (using  $\alpha=.05$  for the hypothesis test)?
  - What would your results be for A - D if you had 32 county pairs, and the mean difference and standard deviation of the difference were the same?

## Practice: Paired t-test

2. What is the role of the  $\alpha$ -level in hypothesis testing?
3. What is the role of the p-value in hypothesis testing?
4. Which of the following quantities depend on data in a paired t-test situation?
  - The true mean difference
  - The p-value
  - The estimated standard error of the sample mean difference
  - The  $\alpha$ -level of the test
  - The sample mean difference

## Practice: Paired t-test

5. Seventy individuals were enrolled in a dietary counseling program intended to promote healthier eating. Each subject had his/her sodium levels measured on the day of enrollment, and after two weeks of counseling. The results of these measurements were as follows:

$$\bar{x}_{pre} = 17.7 \text{ mEq}/8hr$$

$$\bar{x}_{post} = 16.5 \text{ mEq}/8hr$$

$$S_{difference} = 12.2 \text{ mEq}/8hr$$

- Was the change in average sodium excretion statistically significant at the .05 level? Justify your answer numerically.