

## 1. ASSIGNMENT 5

1.1. **Problem 1.** Shear strength measurements derived from unconfined compression tests for two types of soils gave the following results:

Soil Type I	Soil Type II
$n_1=30$	$n_2=35$
$\bar{y}_1=1.65$	$\bar{y}_2=1.43$
$s_1=0.26$	$s_2=0.22$

We are interested in whether the data supports the conclusion that the soils differ in shear strength or not.

- State the null hypothesis.
- State the alternative hypothesis.
- Test whether the shear strengths differ at the  $\alpha$  level of 0.01.
- What is the  $p$ -value for the test?

1.2. **Problem 2.** A declaration by the government of the Bahamas prohibiting U.S. lobstermen from fishing on the Bahamian portion of the continental shelf was expected to reduce the mean weight of lobsters per trap, which was 30.31 pounds before the restriction was imposed.

A random sample of 20 traps harvested after the ban had the following weights:

17.4 18.9 39.6 34.4 19.6  
33.7 37.2 43.4 41.7 27.5  
24.1 39.6 12.2 25.5 22.1  
29.3 21.2 23.8 43.2 24.4

- State the null hypothesis.
- State the alternative hypothesis.
- Test whether data supports the claim that mean weights per trap have decreased at the  $\alpha$  level of 0.05.
- What is the  $p$ -value for the test?

1.3. **Problem 3.** Researchers studying pulmonary function measured anterior compartment pressure of 10 healthy runners and 10 healthy cyclists at maximal oxygen consumption at 80% of maximal oxygen consumption, and at rest. The data is:

	Runners	Cyclists
	$s$	$s$
Rest	3.92	3.98
80% max $VO_2$	3.49	4.95
max $VO_2$	16.9	4.67

- a) Is there sufficient evidence to support a claim that the variability of compartment pressure differs for runners and cyclists at rest? (use  $\alpha=0.05$ )
- b) Is there sufficient evidence to support a claim that the variability of compartment pressure differs for runners and cyclists at 80% max  $VO_2$ ? (use  $\alpha=0.05$ )
- c) Is there sufficient evidence to support a claim that the variability of compartment pressure differs for runners and cyclists at max  $VO_2$ ? (use  $\alpha=0.05$ )

1.4. **Problem 4.** Two methods for teaching reading are applied to randomly selected groups of elementary schoolchildren and each is given a test of reading comprehension. The sample means and variances are:

	Method I	Method II
Number of children	11	14
$\bar{y}$	64	69
$s^2$	52	71

We are interested in whether the data indicates a difference in the mean scores for the two groups.

- a) State the null hypothesis.
- b) State the alternative hypothesis.
- c) Test whether the mean scores differ at the  $\alpha$  level of 0.05.
- d) What is the  $p$ -value for the test?