

01204312 - 2013 Probability (IUP: Section 450)

Homework #11

Due date: Hand-in Class (9-9:15AM) November 26, 2013.

1. Consider the data given below. Calculate
 - a. Sample mean
 - b. Sample median
 - c. Sample trimmed mean
 - d. Sample standard deviation
 - e. The upper and lower sample quartiles
 - f. Draw a boxplot of the data set

Data set									
1.2	0.8	1.0	2.4	2.5	2.8	3.1	4.2	0.9	4.1
5.1	4.0	4.2	4.5	4.7	3.0	4.9	4.4	4.2	2.9

2. Oil Rig Accidents

The number of accidents occurring on a collection of oil rigs for each month during a two-year span has shown below. Construct a point estimate of the average number of accidents per month. What is the standard error of your point estimate?

Oil Rig Accidents

Month	Year 1	Year 2
January	12	17
February	23	11
March	13	25
April	11	16
May	36	28
June	14	10
July	17	22
August	22	26
September	20	13
October	10	14
November	18	14
December	12	15

3. Suppose that $E(X_1) = \mu$, $Var(X_1) = 10$, $E(X_2) = \mu$, and $Var(X_2) = 15$, and consider the point estimates

$$\hat{\mu}_1 = \frac{X_1}{2} + \frac{X_2}{2}$$
$$\hat{\mu}_2 = \frac{X_1}{4} + \frac{3X_2}{4}$$
$$\hat{\mu}_3 = \frac{X_1}{6} + \frac{X_2}{3} + 9$$

- a. Calculate the bias of each point estimate. Is any one of them unbiased?
- b. Calculate the variance of each point estimate. Which one has the smallest variance?
- c. Calculate the mean square error of each point estimate. Which point estimate has the small mean square error when $\mu = 8$?

4. A random sample of 41 glass sheets is obtained and their thicknesses are measured. The sample mean is $\bar{x} = 3.05$ mm and the sample standard deviation is $s = 0.125$ mm.
- Construct a 99% two-sided t -interval for the mean glass thickness. Do you think it is plausible that the mean glass thickness is 2.99 mm?
 - Consider the sample of 41 glass sheets. How many additional glass sheets should be sampled to construct a 99% two-sided t -interval for the average sheet thickness with a length no larger than $L_0 = 0.05$ mm?

* Exercises has been modified from Probability and Statistics for Engineers and Scientists. (3rd Edition) by Anthony J. Hayter (Georgia Institute of Technology)