

### HOMEWORK 3

1. we would like to start an Internet service provider (ISP) and need to estimate the average Internet usage of households in one week.

How many households must we randomly select to be 95 percent sure that the sample mean is within 0.5 minute of the population mean  $\mu$ . Assume that a previous survey of household usage has shown  $\sigma = 7.2$  minutes.

2. In the Al Haouz project in Morocco, it has been estimated that roughly 35% (0.35) of the children in the project area suffer from chronic malnutrition. Using 99% confidence level and 2% margin of error, determine the optimal sample size.

3. Ayşe and Ali applied for the same vacant position in a company. Their GPAs are as follows:

Ayşe's GPA: 3.0 (Class average GPA: 2.5,  $\sigma = 0.7$ )

Ali's GPA: 3.4 (Class average GPA: 2.9,  $\sigma = 0.9$ )

Assuming that class GPAs are distributed as normal, who has higher chance to get the job?

4. Grades of Research Methods class are distributed as normal with mean  $\bar{X} = 56$  and standard deviation  $\sigma = 13$ . Fatma's grade is 80. How many students have grades higher than Fatma's grade? There are 110 students in the class.

5. A sample of size 16 ( $n=16$ ) is drawn from a spare part warehouse. Sample mean length and sample variance are found as  $\bar{X} = 8\text{mm}$  and sample variance  $S^2 = 4\text{mm}^2$ .

a) Using the formula

$$\bar{X} \pm t_{\alpha/2} ( S / \sqrt{n} )$$

construct a confidence interval with a 5% type-one error for the true unknown mean of the population.

b) Will a spare part with length 6.7mm be accepted by customers? Why?

