Statistics - CS	Basic Definition and Concepts
Tutorial 1	

Subjects for discussion:

1. What is the role of *statistics*?
2. What is meant by the terms: *population, sample*? Give examples.
3. What is a random *experiment, outcome, sample space, event*? Describe.
4. How to measure the *probability* of an event? What are mutually exclusive events?
5. What is conditional probability?
6. What is Bayes Theorem?

1. The table describes the distribution of a random sample S of 100 individuals, organized by gender and whether they are right- or left-handed. Let's denote the events M = the subject is male, F = the subject is female, R = the subject is right-handed, L = the subject is left-handed. Compute the following probabilities:

	R	L
Males	43	9
Females	44	4

a. $P(M)$
b. $P(F)$
c. $P(R)$
d. $P(L)$
e. $P(M \text{ AND } R)$
f. $P(F \text{ AND } L)$
g. $P(M \text{ OR } F)$
h. $P(M \text{ OR } R)$
i. $P(F \text{ OR } L)$
j. $P(R|M)$
l. $P(F|L)$
m. $P(L|F)$

2. In a factory four machines produce the same product. Machine A produces 10% of the output, but 0.1% of them may be defective, machine B 20% of the output with 0.05% of defects, machine C 30% with 0.5% with problems, machine D 40% with 0.2% defective. An item selected at random is found to be defective. What is the probability that it was produced by factory A? B? C? D?

3. Are students more likely to smoke when theirs parents smoke? The smoking habits among students and parents is shown in the Table. The "smoke" in case of a student means that she/he smokes, even occasionally, whereas in case of parents means, that at least one parent smokes.

   a) If at least one parent smoked, what is the chance their child (student) smokes?

   b) A student is randomly selected from the study and she/he does not smoke. What is the probability that at least one of her parents smoked?

Students	Parents	
	smoked	not
smoke	125	94
not	85	141

4. Hunter says she is itchy. There is a test for Allergy to Cats, but this test is not always right: For people that really do have the allergy, the test says "Yes" 80% of the timeFor people that do not have the allergy, the test says "Yes" 10% of the time ("false positive") If 1% of the population have the allergy, and Hunter's test says "Yes", what are the chances that Hunter really has the allergy?