Probability and Statistics in Engineering, Fall 2016

Exercise #2

1. Which of the following events are equal? Why?
   A = {1, 3};
   B = {x | x is a number on a die};
   C = {$x \mid x^2 - 4x + 3 = 0$ };
   D = {x | x is the number of heads when six coins are tossed}.

2. Solve the following questions.
   (a) In how many ways can 6 people be lined up to get on a bus?
   (b) If 3 specific persons, among 6, insist on following each other, how many ways are possible?
   (c) If 2 specific persons, among 6, refuse to follow each other, how many ways are possible?

3. Given an electronic component. Let A be the event that the component fails a particular test and B be the event that the component displays strain but does not actually fail. Event A occurs with probability 0.20 and event B occurs with probability 0.35.
   (a) What is the probability that the component does not fail the test?
   (b) What is the probability that a component works perfectly well (i.e., neither displays strain nor fails the test)?
   (c) What is the probability that the component either fails or shows strain in the test?

4. Prove that $P(\mathrm{A}' \cap \mathrm{B}') = 1 + P(\mathrm{A} \cap \mathrm{B}) - P(\mathrm{A}) - P(\mathrm{B})$.

5. The probability that a person visiting his dentist will have an X-ray is 0.6; the probability that a person who has an X-ray will also have a cavity filled is 0.3; and the probability that a person who has had an X-ray and a cavity filled will also have a tooth extracted is 0.1. What is the probability that a person visiting his dentist will have an X-ray, a cavity filled, and a tooth extracted?

6. A regional telephone company operates three identical relay stations at different locations. During a one year period, the number of malfunctions reported by each station and the causes are shown below.

	A	B	C
Problems with electricity supplied	2	1	1
Computer malfunction	4	3	2
Malfunctioning electrical equipment	5	4	2
Caused by other human errors	7	7	5

Suppose that a malfunction was reported and it was found to be caused by other human errors. What is the probability that it came from station C?