

Chapter III: Probability - Exercises

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GROUP 89 - COMPUTER ENGINEERING

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Exercise

A company that administers the net of another company purchases a new antivirus software with the following features.

If there is a virus, the software raises the alarm with probability 0.95.

Even if there is not a virus, the software may raise a false alarm with probability of 0.08.

If the net usually receives a virus attack to each 1000 access, *calculate the probability that when the software raises the alarm that alarm is indeed true.*

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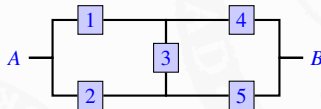
If the net usually receives a virus attack to each 1000 access, *calculate the probability that when the software raises the alarm that alarm is indeed true.*

SOLUTION:

$$\Pr\{\text{"there is a virus"} | \text{"software raises the alarm"}\} = 0.012$$

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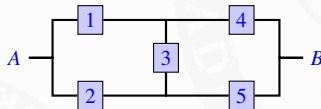
We have a system of connected components according to the following figure:



All components are of similar reliability and have a probability of failure of 0.01. The failures of one component are independent of the state of other components. The system is functioning if you can find between *A* and *B* a path of components operating. **What is the probability that the system works?**

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SOLUTION:

$$\Pr(\text{The system works}) = 0.999798$$

Exercise

Three machines A , B and C produce items with a proportion of defectives of 5%, 3% and 2% respectively. We have a set of 200 items, 100 of them made by A , 50 by B and the rest by C .

We take randomly an item

- a) Calculate the probability that the chosen item is defective.
- b) If the item is defective, calculate the probability that it was made by A . [June '99]

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SOLUTION:

- a) 0.0375;
- b) 0.66.

Exercise

Three students A , B and C share a flat with one phone. Among all receiving phone calls, $2/5$ are for A , $2/5$ are for B and $1/5$ for C . All students spend some time out of their house. It is estimated that A is out 50% of the time, B the 25% and C the 25%. Compute the following probabilities:

- a) There is no one to answer the call.
- b) There is the person whom the call is for.
- c) There are three successive calls for the same person.
- d) There are three successive calls for the three different persons.

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SOLUTION:

- a) 3.125%
- b) 65%
- c) 13.6%
- d) 19.2%