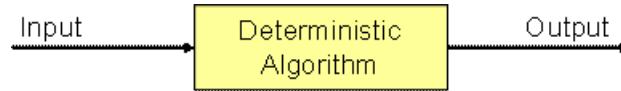


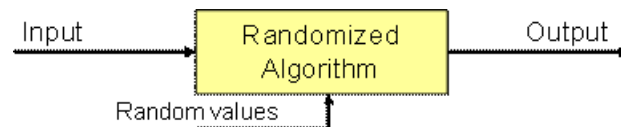
## Algorithm Types

So far, this course has focused on a type of algorithm where the behavior of the algorithm is predictable from the start based on the input being processed. This type of algorithm is referred to as a deterministic algorithm.



The goal of any deterministic algorithm is to solve some computational problem correctly and efficiently. As we will see, this is true of nondeterministic (or randomized) algorithms as well. The primary characteristic of a deterministic algorithm is that a particular input/output pair is always the same. In addition, the time and space required to transform a particular input to a particular output are always the same.

As mentioned above, the goal of the randomized algorithm is the same as the deterministic algorithm. The primary difference between randomized and deterministic algorithms is that the input includes a source for random numbers.



These random numbers are used to make random decisions during the execution of the algorithm. As a result, the behavior of the algorithm can vary, even on the same input.

Earlier in this course, we considered approaches to performance average-case analysis. We need to be clear here that randomized algorithms are not the same as such average-case, probabilistic analysis. In the probabilistic analyses we performed, the performance of the algorithm was assessed relative to a random sample of inputs, and the resulting performance estimation was based on the underlying distribution of that sample. The algorithms analyzed were still deterministic. In the case of the randomized algorithms, performance can vary with the same input, and we actually use the randomization to improve overall performance.