Mathematical modelling and simulation.

If no standard test applies directly or indirectly, one must build a mathematical model or simulation of the process and derive the needed tables by repeatedly running the model.

You don’t need to know any formal programming language, just how to describe a process in a clear step-by-step manner. The conditions and commands must be simple and precise. E.g.

“If the distribution is normal, then use the normal probability table” isn’t

“If  and , then .” is.

Note can mean two things, the statement that “ + 5”, or the command to “set the variable equal to 5”.

Write if we want to test if  or if we want to execute the command to set . (Or use  if you use for the test.)

To do something times write “for  to .”

Suppose we don’t know the formula for the sum of the first numbers, write a program.

Think of how you would do it with paper and pencil. Add 1+2, then add 3, then 4, ... . Let be the sum, start with 0, then successively add 1, 2, 3, ... up to .

Write a program which tosses a coin times and outputs the number of heads.

Write a program which tosses a coin times and outputs “heads” if the toss is heads and “tails” if the toss is tails.

Write a program which calculates (approximately) the probability of getting heads in tosses.

To build probability models we need a random number generator to simulate things like tossing a coin or rolling a die. The function that does this is . Each time it is used it gives a different randomly generated number in [0, 1). Thus produces two randomly generated numbers in [0, 1).

Note that is a random number in [0, 2).