# Variable Parameters

The parameters that we used in note of Value Parameter were called *value* parameters. We could use the value of the argument that was passed into the procedure through the parameter. Value parameters aren't really variables. If you tried to change the value of the parameter in any of your procedures in the last section you would have received an error message. In fact value parameters in Turing are actually constants. So what do we do if we want to change the value of a parameter? We use *variable* parameters.

Changing a value parameter to a variable parameter is very easy. You just need to put the keyword **var** in front of the parameter. As an example, suppose we wanted to write a procedure that would swap the contents of two int variables. The parameters need to be variable parameters since we need to change them.

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| |  | | --- | | **procedure** swap(**var** a : **int** , **var** b : **int**)  **var** temp : **int**    temp := a  a := b  b := temp  **end** swap  *% main program*  **var** first : **int** := 25  **var** second : **int** := 99  **put** "first = ",first, " second = ", second  **put** "Now we'll swap them"  swap(first, second)  **put** "first = ",first, " second = ", second | |

The output from this program is:

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| first = 25 second = 99  Now we'll swap them  first = 99 second = 25 |

Since both parameters are variable and both are type int we could have shortened the header of the procedure to: **procedure** swap(**var** a, b : **int**).

You can mix variable parameters and value parameters in the same procedure. Here is a procedure that picks a random number between two values that you specify, counting by a number you specify. As an example to pick a random number in the set {4, 6, 8, ..., 20} you would call the procedure by saying randomSkip(number, 4, 20, 2). The variable number is the variable that will store the result. The next two parameters specify the range of numbers. The fourth parameter is the number to count by. Only the first argument needs to change so it is the only one that will be a variable parameter.

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| |  | | --- | | **procedure** randomSkip(**var** number : **int**, bottom, top, countBy : **int**)  randint(number, 0, (top - bottom) **div** countBy)  number := number \* countBy + bottom  **end** randomSkip  *% main program*  **var** n : **int**  **for** i : 1 .. 10  randomSkip(n, 4, 20, 2)  **put** n  **end** **for** | |

Here is a sample run of the program choosing ten random numbers from {4, 6, 8, ..., 20} (of course each time you run it you will get different results):

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| 18  16  8  4  16  4  6  14  4  20 |