Aalto University
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Short intro to using Mathematica and example with Poisson process

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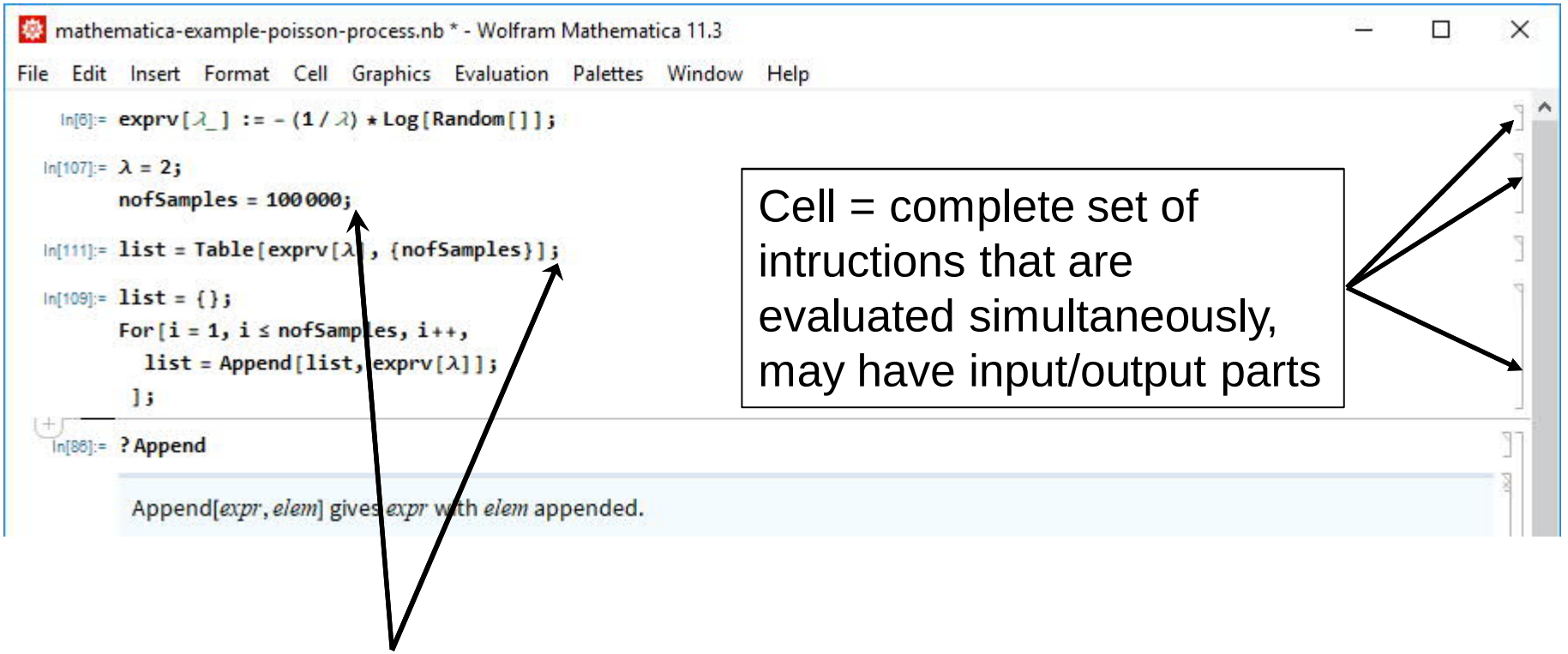
Mathematica notebook window



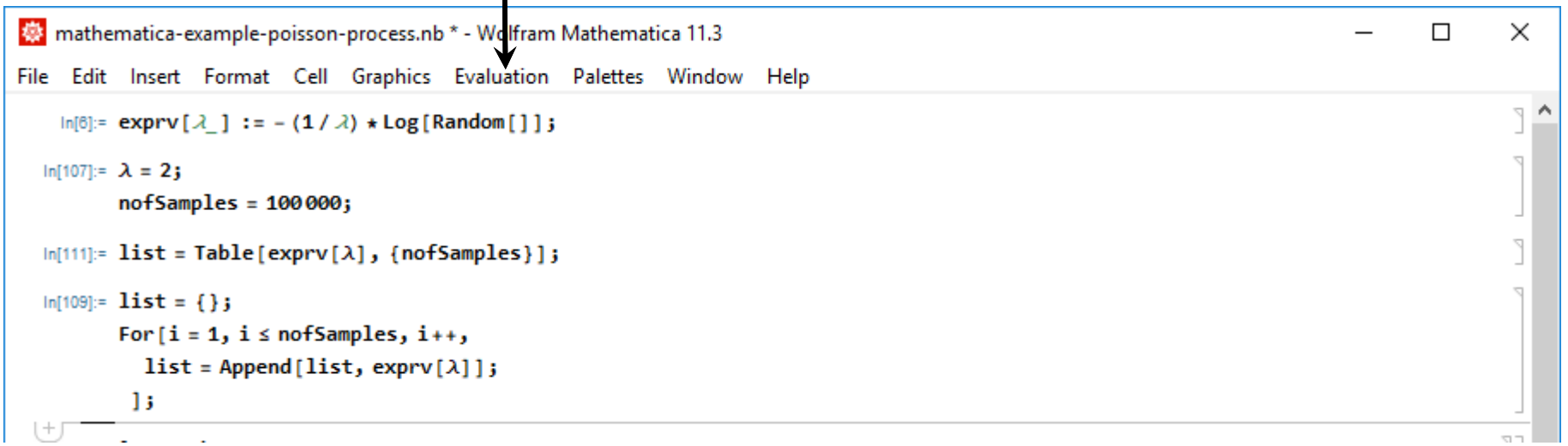
- A semi-colon (;) at end of statement means that no output is produced for that command

- To evaluate a cell you must press [SHIFT + RETURN] !!

Mathematica kernel

- Mathematica consists of the notebook window and the computational engine, the **kernel**

- In the Evaluation-menu there are commands to control kernel
  - Abort evaluation
  - Quit kernel (if nothing else helps)



Getting help

- In the notebook window, you can find help on functions by typing

```
? any_expression
```

  - You can use wildcard symbol ”*” in expressions

- Example

```
? *Plot*
```

  - Produces a list of all functions that contain ”Plot” anywhere in the command name

Working with lists (1)

- Output of any command or function in Mathematica is always a list!

- Let's create a simple list

```
list={1,2,3,4};
```

  - To create the list, use curly braces - {} !!
  - Lists can have an arbitrary nested structure
  - Elements of lists can be of any mixed types

Working with lists (2)

- List operations:
  - `list[[i]]` : element (i) of list
  - Other list commands `Append[]`, `Select[]`,....
  - Commands for data arrays: `Total[] (= sum of elements)`, `Mean[], Variance[],…`

- Example: access the first element in the list

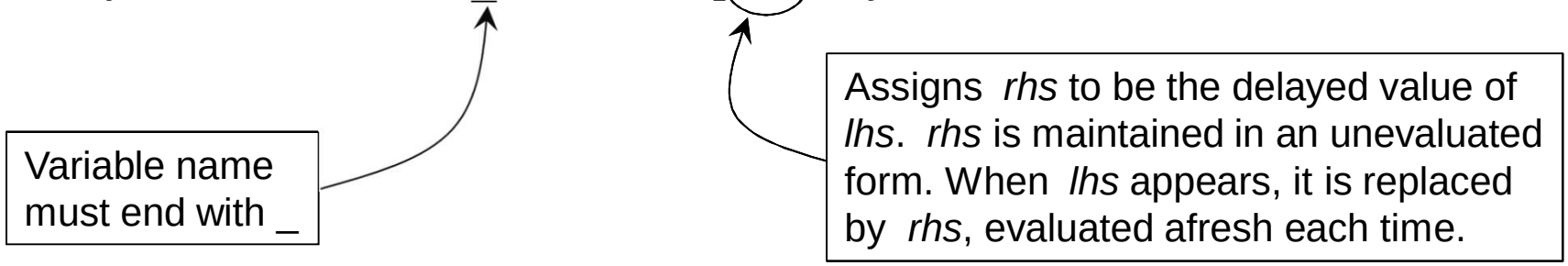
`list[[1]]`

Observe the need for two brackets [[ ]] !

Creating a function in Mathematica

- Function declaration

```
myFunction[var1_,var2_,…]:= ”my_code” ;
```



- Example: inverse function method for exp-random variables

```
exprv[m_]:= -(1/m)*Log[Random[]];
```

Typical control commands

- Typical control commands (For-loop, While-loop, If-statement) are also implemented as functions in Mathematica
  - Syntax is then CommandName[arguments]

- Examples

```
While[test,"myCode"]

For[initialize,test,increment,"myCode"]

If[test,"myCode for true", "myCode for false"]
```

Practical example

- In course homepage, look at the file

  “mathematica-example-poisson-process.nb”