# Functions

## Learning Objectives

- Explain a Matlab function file.
- Define a function that takes parameters.
- Test a function.
- Know why we should divide programs into small, single-purpose functions.

**Part 1 – Inbuilt Functions**

Function syntax

When called in script or command line

`[Out1, Out2, ...] = function_name(In1, In2, ...)`

In first line of function definition

`function [Out1, Out2, ...] = function_name(In1, In2, ...)`

Functions we've used so far

Mean `M = mean(A,dim)`

Max `M = min(A,[],dim)`

Num2str `s = num2str(A)`

Etc.

Input and Output arguments in documentation

Draw concept map of a function

**Part 2 – Writing Functions**

Variable scope – variables defined in functions are only visible there.

- For something to be useable in a function you have to either pass it to it, or define it within.

Use challenge answer in a script to explain variable scope (split the screen between script and function)

**Part 3 – Commenting Functions**

We need to write documentation about functions to help other people (and our future selves)

Go over answer to sumprod code with comments

Put into sumprod code:

```
% [vsum, vprod] = sumprod(v)
% Calculate the sum (vsum)
% and the product (vprod)
% of the inputs v1 and v2.
% Also return a string (checksize) stating the relative size of vsum
% and vprod
```

Things we do to every data set can be put in functions

Want to shift our data so that the mean = whatever we want it to be. (explain why shifting the mean is useful e.g. – want to just compare changes in data and ignore baseline offset)

Use patient data & plot

Subtract mean and plot again (it is now zero mean)

Shift data and plot again (it now has a new baseline so the whole thing is shifted)

```
out = (data - mean(data))
out = (data - mean(data)) + desired
```