Doing Economics with the Computer

Lecture 3: SOLUTIONS PDF

Harris Dellas
Lucas Kyriacou

Introduction to Matlab: Functions

The objective of this exercise is to show you how you can write functions. Important note: you have to code functions in a separate m-File. Therefore these solutions are only for illustrative purposes.

Compulsory Readings

Read chapter 6 in Attaway (2019). The book is provided on Ilias.

Further Exercises

Practice by going through the practice questions in chapter 6 in Attaway (2019). Solutions to the practice questions are available on Ilias.

Housekeeping

When you write a script, you should include these commands at the start.

```
clear all % Deletes memory
close all % closes open windows (figures etc.)
clc       % clears command window
```

1 General Form

The general form of a function file is as follows: To create it, right-click in 'Current Folder', New File, Function

```
function [outputArg1,outputArg2] = untitled(inputArg1,inputArg2)
%doSth Summary of this function goes here
%   Detailed explanation goes here
outputArg1 = inputArg1;
outputArg2 = inputArg2;
end
```

In Class Exercise 1

Consider the geometric series $x(n) = q^{n-1}, n = 1, 2, \ldots$. Compute the sum $s(n) = 1 + q + q^2 + q^3 + \ldots + q^{n-1}$ for q = 0.5 and n = 10 using a function. Create a function file, sgs.m, that contains the function below. To produce the result call the function by typing: ssum= sgs(0.5, 10).

```
function ssum=sgs(q,n)
% Calculates the sum of n terms of a geometric series with progression q
s=[]; s(1)=1;
for i=1:n
    s(i+1)=s(i)+q^i;
end
ssum=s(end);
end

ssum= sgs(0.5, 10)
```

In Class Exercise 2

Write a function that computes the hypotenuse and the sum of the sides of a right angled triangle. Let the two sides be 4 and 5 respectively Create a function file, hypo.m, that contains the below function. To produce the result call the function [h,s] = hypo(4,5).

```
function [h,s] = hypo(a,b)
% This function first computes the hypotenuse,h, of a triangle with sides of length a and b
% and then computes the sum,s,  of the three sides
    h=sqrt(a^2+b^2);
    s=a+b+h;
end

[h,s] = hypo(4,5)
```

In Class Exercise 3

Write a function that computes the hypotenuse and the sum of the sides of a right angled triangle with sides 4 and 5 as in exercise 2 above but now have one function call another, i.e.: Write a function that computes the hypotenuse and calls the function summy that computes the sum of the sides. Get the objects of interest by inputting at the command prompt: [h,s]=hyposum(4,5).

```
function [h,s] = hyposum(a,b)
% Computes the hypotenuse and calls the function summy that computes the sum of the sides
    h=sqrt(a^2+b^2);
    s=summy(h,a,b);
end

function [s] = summy(h,a,b)
% Computes the sum of the sides
    s=h+a+b;
end

[h,s]=hyposum(4,5)
```

Time permitting, In Class Exercise 4

The function hdss.m solves for the steady state values of capital and consumption in the standard economic growth model. Note that the function is written as f(x)=0. In order to solve this problem define the parameter values: alpha=0.35; beta=0.99; delta=0.025; A=1; $param = [alpha; beta; delta; A]$; Give initial guess of k and c, k0, c0: $k0 = 10; c0 = 1; x0 = [k0; c0]$; Then call the non-linear solver fcsolve to solve the system of the two non-linear equations as: x = fcsolve('hdss',x0,[],param);.

```
alpha=0.35;
beta=0.99;
delta=0.025;
A=1;
param=[alpha; beta; delta; A];

k0=10;
c0=1;
x0=[k0; c0];

z = hdss(x0,param);
x = fcsolve('hdss',x0,[],param);
```