CompEcon - Problem Set 1

Yuna Aulia and Ruggero Jappelli

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1 Exercise 3

1.1

Matlab Code for Bisection Algorithm

```
% Bisection Method
clear
clc
%% Tolerance
tol = 1.e-10;
% Function
myFunction = @(x) x.^3 + 4 - 1/x;
% Initial Values
x_lower = -100;
x_upper = 100;

x_mid = (x_lower + x_upper)/2;

while abs(myFunction(x_mid))>tol
    if (myFunction(x_mid)*myFunction(x_lower)) < 0
        x_upper = x_mid;
    else
        x_lower = x_mid;
    end
    x_mid = (x_lower + x_upper)/2;
end
fprintf ('The root is %g\n', x_mid)
```

1.2

We use the bisection method to compute the zeroes of the following functions:
The function

$$f(x) = x^3 + 4 - 1/x$$

has a root $x = 0.249038$

The function

$$f(x) = -exp(-x) + exp(-x^2)$$

has a root $x = 0$ and a root at 51, obtained varying the starting points.

1.3

$$b \times q + d \times q^{\phi} - (a - c) = 0$$

Assume

$$a = 3, b = 0.5, c = d = 1, \psi = 0.5$$

We then have

$$\frac{q}{2} + \sqrt{q} - 2 = 0$$

analytical solution:

$$q = (2 - \frac{q}{2})^2$$

$$q = 4 + \frac{q^2}{4} - 2q$$

$$0 = \frac{q^2}{4} - 3q + 4$$

$$q^2 - 12q + 16 = 0$$

$$q = \frac{12 \pm \sqrt{12^2 - 64}}{2}$$

The positive solution is 1.527864045.
The solution computed with the bisection method is 1.52786
Similarly, with the matlab built-in function fzero the solution is: 1.527864045000420

2 Exercise 4 - A Contribution to the Empirics of Economic Growth

Matlab Code for Exercises 4.1

We load the data with import data as a table, excluding rows with unimportable cells. After cheching with the matlab function isnan, we have 104 countries in our dataset.

Matlab Code for Exercises 4.2-4.3

```
Nonoil = MRW92QJEdata(MRW92QJEdata.Nonoil==1,:);
intermediate = MRW92QJEdata(MRW92QJEdata.intermediate==1,:);
OECD = MRW92QJEdata(MRW92QJEdata.oecd==1,:);

%Nonoil Subsample
gdp1985 = Nonoil.gdpadult1985;
gdp1960 = Nonoil.gdpadult1960;
log_gdp1985 = log(gdp1985);
log_gdp1960 = log(gdp1960);
Iy = Nonoil.Iy;
log_Iy = log(Iy);
popgr = Nonoil.growthworkingagepop;
log_growth = log(popgr + 0.5);
school = Nonoil.school;
log_school = log(school);
y = log_gdp1985 - log_gdp1960;
X = [ones(size(log_gdp1960)) log_gdp1960 log_Iy log_growth log_school];
```

```
[a] = regress(y,X)

%intermediate Subsample
gdp1985 = intermediate.gdpadult1985;
gdp1960 = intermediate.gdpadult1960;
log_gdp1985 = log(gdp1985);
log_gdp1960 = log(gdp1960);
Iy = intermediate.Iy;
log_Iy = log(Iy);
popgr = intermediate.growthworkingagepop;
log_growth = log(popgr + 0.5);
school = intermediate.school;
log_school = log(school);
y = log_gdp1985 - log_gdp1960;
X = [ones(size(log_gdp1960)) log_gdp1960 log_Iy log_growth log_school];
[b] = regress(y,X)



%OECD Subsample
gdp1985 = OECD.gdpadult1985;
gdp1960 = OECD.gdpadult1960;
log_gdp1985 = log(gdp1985);
log_gdp1960 = log(gdp1960);
Iy = OECD.Iy;
log_Iy = log(Iy);
popgr = OECD.growthworkingagepop;
log_growth = log(popgr + 0.5);
school = OECD.school;
log_school = log(school);
y = log_gdp1985 - log_gdp1960;
X = [ones(size(log_gdp1960)) log_gdp1960 log_Iy log_growth log_school];
[c] = regress(y,X)


P = [a b c]
```

Exercises 4 Part 4

Table 1: Summary statistics

Dependent variable: log difference GDP per working-age person 1960-1985			
	(Non Oil) OLS	(Intermediate) OLS	(OECD) OLS
CONSTANT	1.112436013441833	1.655664821192208	2.611627292608531
log(gdp1960)	-0.296562179734063	-0.373493872465916	-0.399271205189533
log(I/y)	0.521228337626152	0.536026177101351	0.353093631576787
log(popgrowth + g + δ)	-0.181085002271978	-0.187462038101107	-0.215690701932586
log(school)	0.233556041609175	0.273303053483721	0.235819465739553
N	98	75	22

The coefficients in the table mirror very closely the ones in Table V in A Contribution to the Empirics of Economic Growth [1], with the exception of log(popgrowth + g + δ), since it is different by construction, and consequently the CONSTANT terms. All the other coefficient estimates are consistent with the results in Mankiw, Romer, and Weil (1992).

[1] Mankiw, Romer, and Weil (1992), The Quarterly Journal of Economics, Vol. 107(2), pp. 407-437