Tips for Problem Set 1

Problem 1

Tip 1.1: Look at the notes for Worksheet 1 and for solving the free trade economy. Most everything is very similar.

Tip 1.2: The Lagrangian and FOCs are nearly identical to the ones in the notes. The budget constraint is different, but otherwise $\partial\big(\theta_1 \log c_m^i\big)/\partial c_m^i = \theta/c_m^i$ is the same.

Tip 1.3: When solving the consumer's problem, you can jump right to constant expenditure shares for each good since we have Cobb-Douglas preferences.

Tip 1.4: If relative prices don't change with T, you did something wrong. Probably when using your labor clearing constraint (constant expenditure shares don't necessarily imply constant labor allocation shares).

Tip 1.5: The balanced current account is separate from the market clearing conditions, and not needed when you define the equilibrium. It will hold in equilibrium, it just does so automatically (even without Walras' law) since. If you want to use it when solving the equilibrium, however, you may.

Tip 1.6: Don't worry very much about how exactly you combine equilibrium conditions. Just try things until something works or eliminates one of the endogenous variables from your expressions. If you accidentally use the same equilibrium equation twice you'll most likely end up with an identity when you simplify (i.e. 1=1). It doesn't break anything, it just means you need to try something different.

Tip 1.7: The important thing is to not sit around because you don't know where to start. Follow the notes for the other models and start trying things until you get something that works. It will take a long time, but eventually you'll get it, and the only way to learn is by figuring it out yourself.

Tip 1.8: The terms of trade are the price of exports relative to the price of imports. For the Foreign country that's p_2/p_1.

Tip 1.9: Shortcut commands for Microsoft Word Equation Editor: Link 1 Link 2

Tip 1.10: You save a lot of time if you copy and paste your equations rather than retyping everything every single time. With practice, doing algebra on the computer will be much faster (and have fewer mistakes) than writing everything by hand.

Tip 1.11: Save often, since Word doesn't have the best stability. Other word processors, such as LaTeX (I use Texworks for my papers) are more stable and flexible if you'd rather use something else, however they have much higher learning curves

Tip 1.12: We won't cover it in this class, but Mathematica can do symbolic computing. I highly recommend learning a symbolic computing language to help check your work and do simple calculus for you. WolframAlpha can provide this on a very limited basis.

Problem 2

Tip 2.1: To download the code to your desktop, right click on the link and select "Save As". Depending on your browser the exact wording may differ slightly. Examples below
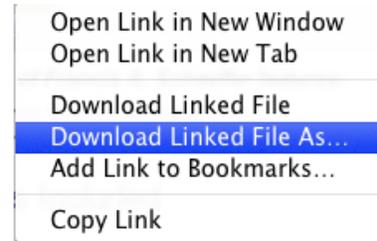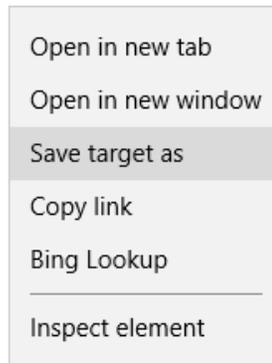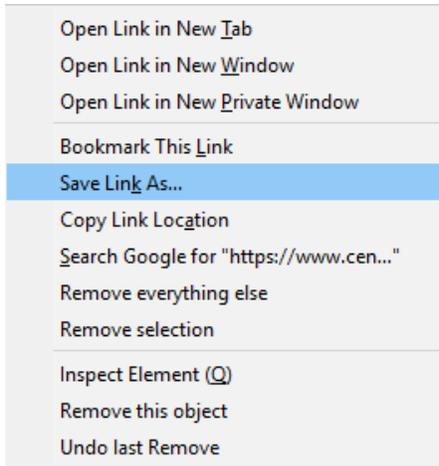

Tip 2.2: Don't edit code in a word processor such as Microsoft Word. Use a plain text editor such as Notepad. Even better, use a plain text editor with syntax highlighting such as Notepad++. Notepad++ should recognize the code automatically due to the .r file extension. If it's not enabled you can enable it under "Language"

To Edit Code:

Way 1: Do "File"→"Open" in Notepad++ or Notepad, then select the code file.

Way 2: Right click on file and select "Edit with Notepad++"
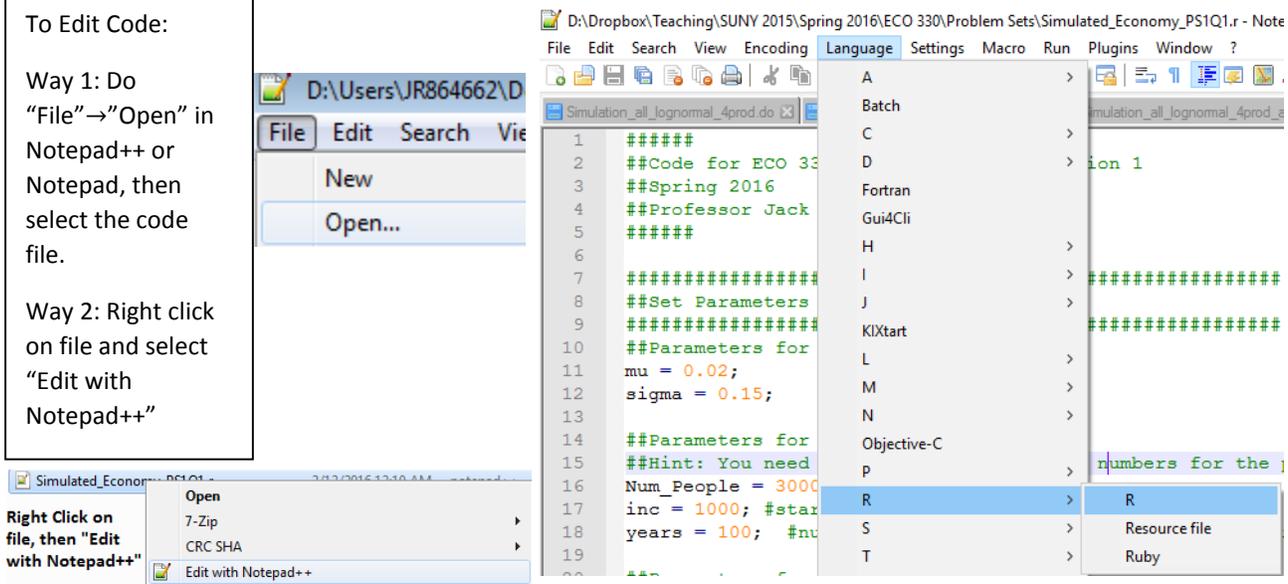
Tip 2.3: You can download R from https://cran.r-project.org/ for free. It should already be installed on all the computers in the computer labs.

Tip 2.4: There are manuals to help you learn R available on the CRAN website https://cran.r-project.org/manuals.html and elsewhere on the internet. The "help" function in R is also useful if you don't understand what a function does. For example, typing help(max) will tell you what the max() function does.

Tip 2.5: Use the example code to figure out how R works. Instead of rewriting everything from scratch, re-use chunks of my code and adapt them for this problem. Trial and error works great for figuring out what each part of the code does.

Tip 2.6: Numerical solvers are sensitive to initial points. As long as the parameters don't change too drastically, the symmetric equilibrium is often a good starting point for the algorithm.

Tip 2.7: Even though I put it in my example code, you shouldn't have to worry about non-negativity for this problem. Also, each country will have positive labor input for both of its goods in this problem.

Tip 2.8: The goal of this class is to teach basic principles regarding solving economic models on computers (such as Walras' law and normalizing a price), which generalize beyond specific software and programming languages. If you don't know how to do something in R, or your code isn't working, google for help or ask a classmate. We will spend some time in the computer lab practicing, but otherwise I will not be providing additional software support. Getting everything running will take some time, and may be occasionally frustrating, but that's why you have three weeks to do this problem set (do not put it off, or you likely won't finish). You do not have to use R if you prefer to use a different programming language, such as Python or Matlab.

Tip 2.9: Google "Coding Best Practices" to find tips on how to write readable code that is conducive to debugging and editing.

Problem 3

Tip 3.1: Make sure to register an account on WITS (http://wits.worldbank.org/register.html) as soon as possible. If you need help downloading the data from the website, we will go over it in class on Friday Feb 19th. Otherwise, you can ask a classmate for help. The website is fairly self-explanatory and the problem set says exactly what you need to download, so you should be able to figure it out after clicking around some (Go to "Advanced Query"→"Trade Data (UN Comtrade)". The reason we use WITS instead of Comtrade is because WITS reports aggregated data for "All Countries."

Tip 3.2: Not all goods are traded in both 1990 and 2010, and not all goods exported by "All Countries" will be exported by the World. In excel, the Vlookup function and/or Pivot Tables can be helpful for aligning the data.

Tip 3.3: When looking at growth for goods with a RCA Index > 1 you can use the SUMIF function or you can sort the data by RCA Index value and do everything by hand. Array Functions may also be helpful.

Tip 3.4: You do not have to use Excel for this problem if you prefer something else. Some other options are R or STATA, both of which should be installed in university computer labs.