The Rstudio175 cloud server for Demog/Econ C175

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Contents

1 Introduction

The Rstudio175 cloud server (https://rstudio175.demog.berkeley.edu) is the computing infrastructure for all of the homework assignments in Demog/Econ 175. If you are not enrolled in this course, then you do not need to read this. **If you are a concurrent enrollment student, keep reading but also please send email to cmason@berkeley.edu to request access to the cloud server.**

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*Please email corrections and complaints to cmason@berkeley.edu

> **We recommend using the Rstudio175 Cloud Server** described below. However, it is also possible to to install the **Desktop** version of Rstudio on your own machine and run the program locally.
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> The Rstudio175 Cloud Server, will be maintained and supported so as to optimize your experience in Demography/Economics C175 and minimize your need to be your own system administrator. **There is no need to install Desktop Rstudio** unless you either like being your own sys/admin, or you plan to do your homework on a planet where there is no internet[a]. Be aware that you're pretty much on your own with the Desktop version.
>
> ───────
> [a]Another good reason to install Desktop Rstudio is if you plan to use R for projects outside of Demog/Econ C175

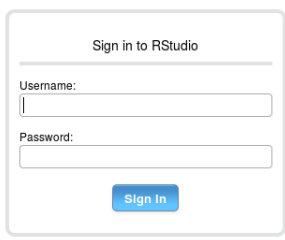## 2 Logging in to the Rstudio175 Cloud Server for the first time

Shortly after registering for C175, you should receive email with instructions on how to initialize your account by setting your password. All you should need to do is click on the link included in the email, and provide a new password. If you never received this email verify that you are registered, then send email to cmason@berkeley.edu. Note that you must initialize your account within two weeks of the start of the semester to avoid administrative hurdles.

Once you have established a password for your Rstudio175 Cloud account, go to http://courses.demog.berkeley.edu/goldstein175. The top of the page looks something like this:
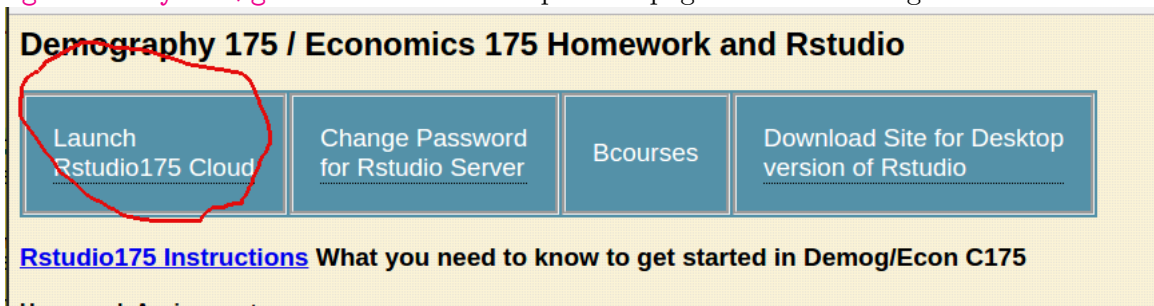
Unsurprisingly, the button labeled "Launch Rstudio175 Cloud" will launch the Rstudio Cloud Server in a separate window or browser tab.

With any luck you should soon be confronted with a web page sporting the Rstudio login dialog:

Your username, (as indicated in the above mentioned email) is your Calnet ID (that is, the part of your @berkeley.edu email address that comes before the '@'. **but your password is whatever you set it to be**: Rstudio175 uses an entirely separate password database from that of Calnet.

3 Some things to notice about Rstudio

Once you have successfully given your Calnet ID and Rstudio175 password, your browser window becomes a modern IDE[1] IDEs are quite complicated programs used by professionals to make writing programs more efficient and less error prone.

You will use only a small fraction of the features of Rstudio – but should you (wisely) go on to master R, you will come to be amazed at the cleverness of this thing. Unfortunately, before amazement comes bewilderment at the number of features present.

Your initial Rstudio window should look something like this:
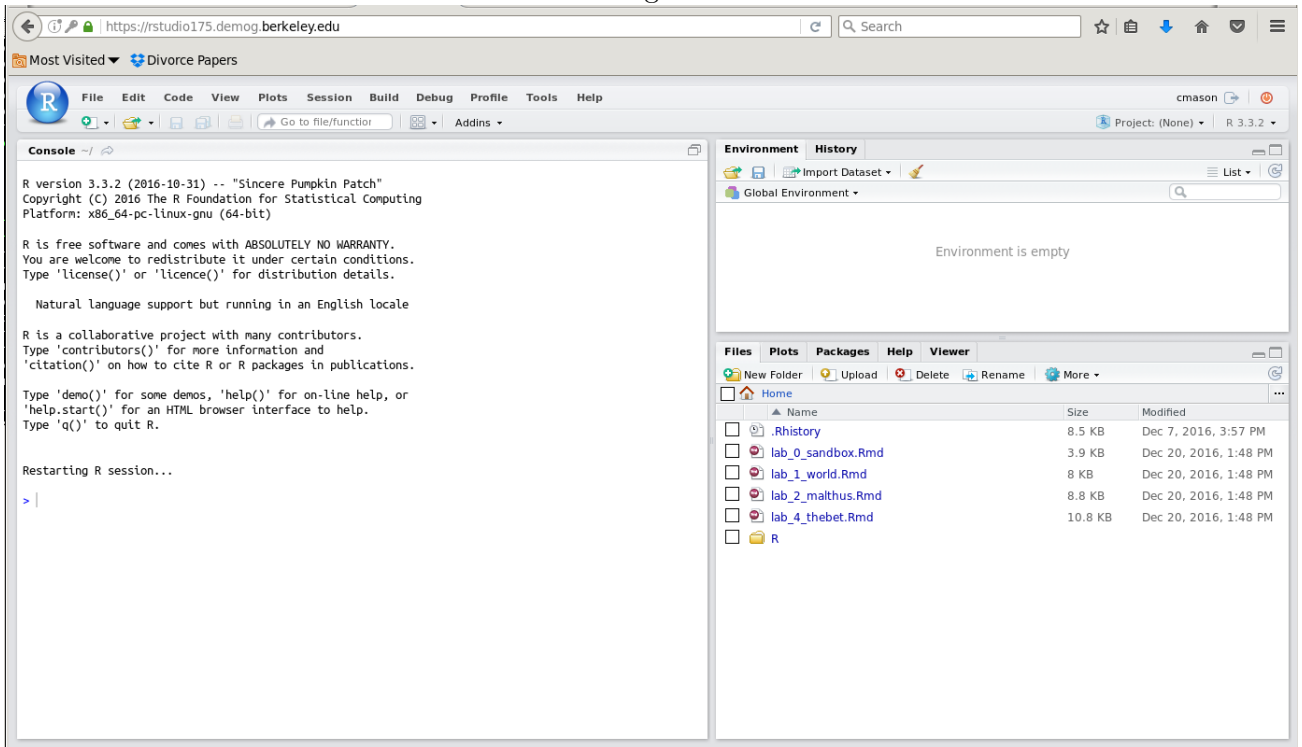

BEFORE touching anything Please Notice the following:

- The left hand pane, labeled "console" is an R interpreter. It functions just like the R interpreter at http://tryr.codeschool.com/: It provides a prompt > at which you can type R commands which are then *interpreted* by the R process.

  That last sentence will make a lot more sense after you complete the first 5 chapters of http://tryr.codeschool.com. It's not essential that you do codeschool until the beginning of the third week, but the sooner you do it the sooner you will begin to appreciate R.

  It is important to understand that the R console is there, but as we'll see, R notebooks offer a more convenient way to have our R code processed, so we won't interact much with the R console in this course.

- The lower right hand pane should hold the file viewer. If it does not look a lot like the picture above, then make sure the "Files" tab is depressed.

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[1]IDE stands for *Integrated Development Environment* which means a computer program that helps you write computer programs.
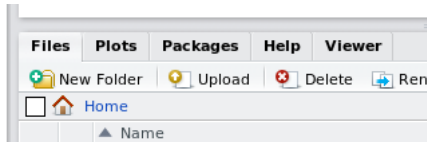
The file viewer gives you access to your files. For now, you may have just one or two files with names like 'lab_1_world.Rmd'. More will appear later without any effort on your part. These files are the R notebooks which hold your weekly homework assignments. The files download automatically **if your directory does not already contain a file with the same name**. This means that if, while working on one of your assignments, you decide to declare bankruptcy and start over, you can simply delete or rename the file (check the box and hit the delete or rename button) then restart your R session and a fresh copy of the file will be there.

To restart your R session, press the orange button in the upper right corner of the Rstudio screen. Killing the browser window –or the entire browser, will only *suspend* your session. The files are (re)downloaded only when the R session **restarts**.

- To work on a homework assignment, simply click on the blue hypertext file name and behold: the *Console* pane will shrink to a little nothing at the bottom of the window and its former place will be filled with an "R notebook".
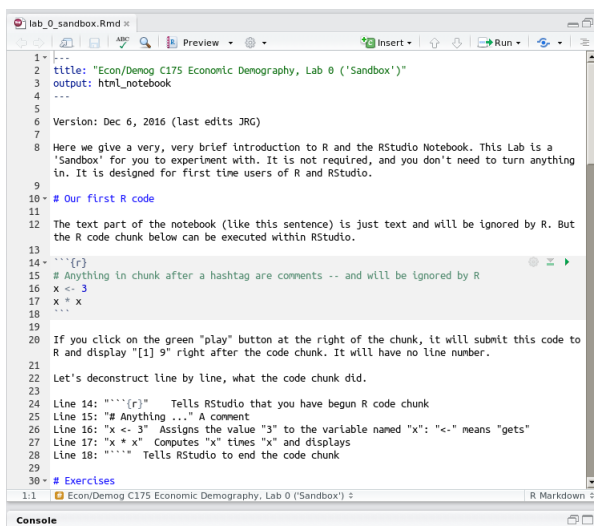
4 Working in Rstudio

The majority of your work should be within the "R notebook". That is, most of what you will do for homework will be to read the instructions (in the R notebook); then execute some code; then change the code and execute it again.

The purpose of the code is to learn. Once you have learned what you can from the code, you will go to Bcourses and answer the questions at the end of each R notebook.

4.1 Executing code chunks

In the R notebook, code comes in "chunks" interspersed with regular text. The code chunks look like this:

```
47
48 ▾ ```{r}
49   N.2017 <- 7.3  # Billions of people
50   N.2100.estimated <- N.2017 * exp(.01 * 83)   # N(0) e^{R t}
51   print(N.2100.estimated)
52   ```
53   We get about 17 billion  more than twice as many people as there are today
```

They are set off from the text by a light gray background and have three buttons in their upper right corner. The green triangle on the far right is the most useful, it executes the code **in the current chunk only**. You'll generally want to use this button after making changes to the code chunk.

4.2   Checking your work

In order to keep you from going off the rails, each R notebook contains a few special code chunks which are designed to check your work. This is not for grading purposes, but rather to let you know that you are doing things right.

The special code chunks look and function the same way other code chunks function– you make changes to the code then execute it by hitting the green triangle.

```
'8 ▾ ```{r}
'9   ## Replace the NA with your answer (e.g., 'A' in quotes)
30   answer1.1 = NA
31   check(answer1.1)
32   ```
33
```

The difference is that these code chunks expect you to change only the line that assigns a value to a variable called **answer1.1** (1.1 will of course change). After specifying the answer and running the code chunk, you will receive either a dopamine rich message of congratulations, or encouraging hint. You may execute these chunks as many times as you wish. Their purpose is to help you –not to judge you.

4.3   Bcourses

When you have finished the week's R notebook, visit Bcourses and answer the questions pertaining to the assignment that you just did. The Bcourses part of each week's assignment will be graded. The questions for each lab exercise are staged in Bcourses as "Quizzes". At the top of the http://courses.demog.berkeley.edu/goldstein175 page is a button labeled "Bcourses 'Quizzes'".

5   Resources for learning R, R studio and R notebook

There are three distinct parts to the learning infrastructure that we will use in Demog/Econ C175:

1. **R** the venerable programming language

2. **R studio** the new-ish IDE for programming in R

3. **R notebook** the very new file format for mixing R code and text.

5.1   R

Of these three, R, the programming language is by far the hardest. Luckily, there are numerous free web resources to help. Type "learn R" into your favorite search engine for a more comprehensive list list, but here are some of our favorites - **including `codeschool.com` which we expect you to actually do**:

1.

   `tryr.codeschool.com` Great magical browser interface for learning basics of programming in R. **We expect that you will complete the first five chapters of tryr.codeschool.com by the beginning of the third week of class. Doing more and doing it sooner will make the assignments much easier.**

2. `https://cran.r-project.org/doc/contrib/Torfs+Brauer-Short-R-Intro.pdf` *(very) short introduction to R* A fairly complete, and not that short, overview of the R language. Note that Rstudio has changed a lot recently so don't pay too much attention to their description of R studio. But otherwise a very good overview, especially for those with a bit of computing experience. Even raw beginners may find this useful to skim, particularly after having tried the first few labs.

3. Google developers youtube videos "Intro to R" For those who prefer videos, this is a great series. Just note that they do not use Rstudio, so you'll need to modify a few of the commands.

4. `https://www.datacamp.com/home` Data Camp has videos and exercises. The first course in R is free and quite good. It takes a bit longer than Codeschool because it is a bit more thorough.

5. `http://dlab.berkeley.edu` The "dlab" is a great resource for learning all sorts of thing including R. It is conveniently located in Barrows Hall.

5.2 R notebook

R notebook is quite new, so there are few resources for learning about it. If you have had experience with Jupyter Notebook (as used in Data Science 8) you'll get the idea pretty fast.

1. `https://www.rstudio.com/resources/webinars/introducing-notebooks-with-r-markdown/` A "webinar" produced by rstudio.com. It's interesting, but you don't need it in order to succeed in this class.

   A useful overview of R notebooks is available at `http://rmarkdown.rstudio.com/r_notebooks.html`

5.3 R studio

R studio is both new-ish and quite complex. For this course, the key thing is to avoid being distracted by all the shiny objects that R studio presents. We intend to use just a tiny fraction of the features that R studio makes available.

1. `https://www.rstudio.com/resources/webinars/` rstudio.org has produced several "webinars" on Rstudio. We don't think you **need** to use any of them, but if you like this sort of thing...

6 Piazza

Students are highly encouraged to post their questions (and answers) regarding R programming and/or Rstudio to Piazza. We want this to be a common resource that will enable you to learn from each other. The graduate students enrolled in Demog/Econ C175 have kindly agreed to help answer your R questions. (No question is a bad question. Just remember, "Always be nice!")