

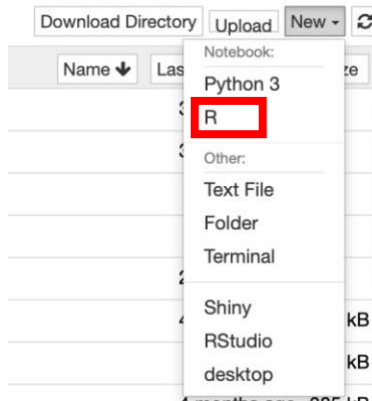
# R in JupyterHub

## Log in to RStudio

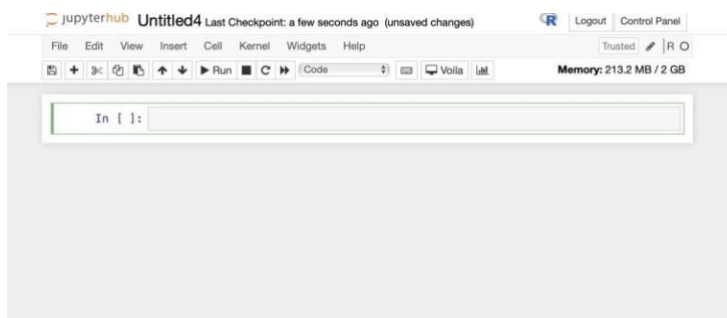
1. Go to [datatools.utoronto.ca](https://datatools.utoronto.ca). Select **RStudio** and log in with your UTORid and password when prompted.

## Create a New Notebook

1. Click on the **New** button, then select option **R** to open a new Jupyter Notebook for R.



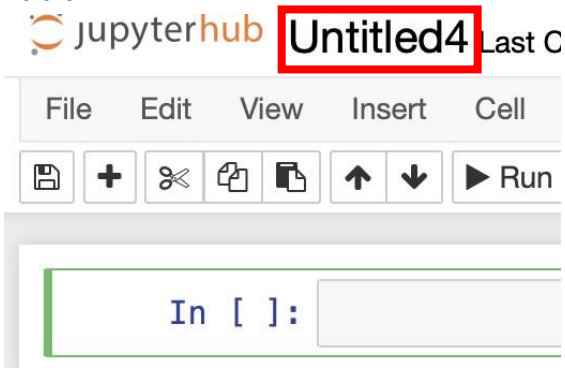
2. The notebook is created, and you should be able to see something familiar to the following:



## Renaming the notebook

1. Click the text **"Untitled"** on the left-top and rename the notebook:

Before:



After:

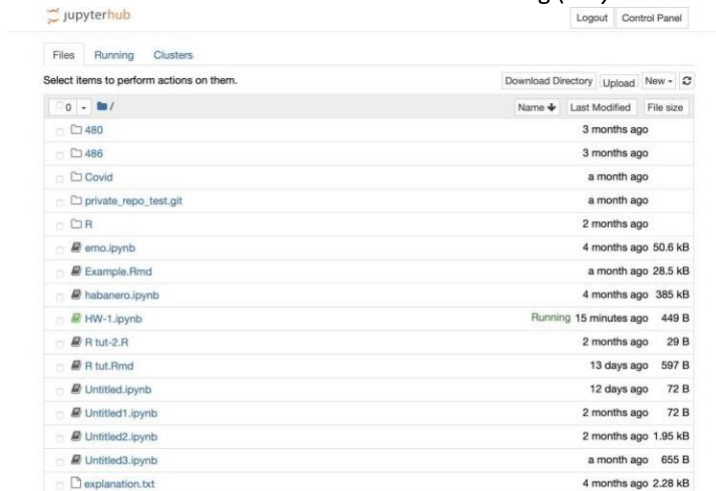


### Back to the files tab

1. Click the "**jupyterhub**" on the top-left to get back to the main files section



2. The files section should look familiar to the following (*they are some created files*):



3. The file marked with the "**Running**" status is the file just created



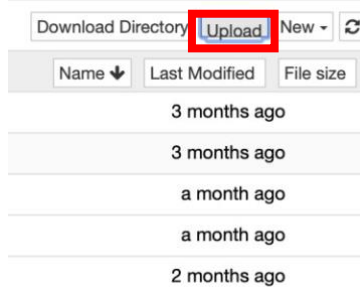
## Shutdown files

1. To shut down the Running file, select the file, and then click the **"Shutdown"** button on the top left.



## Upload and Download files

1. Click the **"Upload"** button on the top right, then you can choose the files you want to upload:



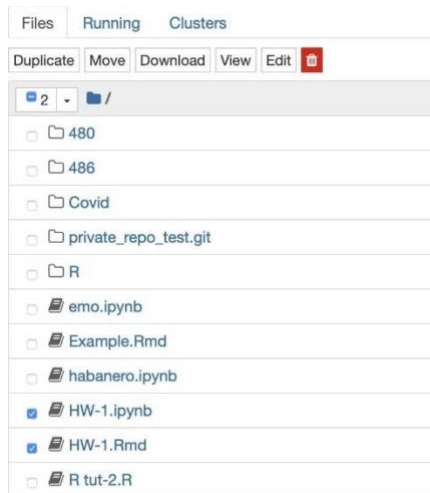
2. After choosing the file from local, you will see something familiar to the following:



3. To finish the uploading, you need to click the blue **"Upload"** button after the file you choose. If you don't want to upload a file, you should click the **"Cancel"** button.

## Download files

1. To download files, first choose the files you want to download in the files tab, then click the **"Download"** button at the top left of the menu.



2. You can also Duplicate, Move, View and Edit the files.

## Working with the notebook

a) Code cell to write code (R code). Ex:

```
In [ ]: set.seed(2212)
rs <- rgamma(10,shape = 4, scale = 2)

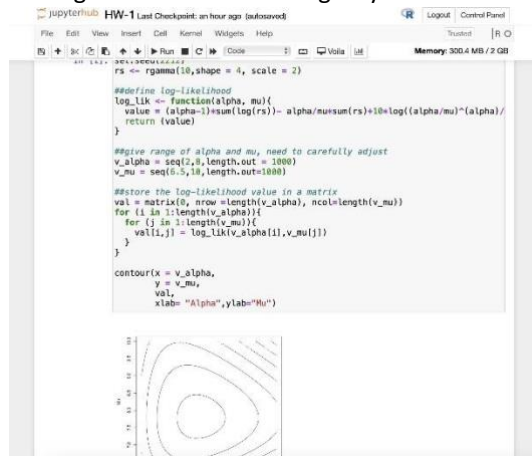
##define log-likelihood
log_lik <- function(alpha, mu){
  value = (alpha-1)*sum(log(rs))- alpha/mu*sum(rs)+10*log(alpha/mu)^(alpha)/
  return (value)
}

##give range of alpha and mu, need to carefully adjust
v_alpha = seq(2,8,length.out = 1000)
v_mu = seq(6.5,10,length.out=1000)

##store the log-likelihood value in a matrix
val = matrix(0, nrow=length(v_alpha), ncol=length(v_mu))
for (i in 1:length(v_alpha)){
  for (j in 1:length(v_mu)){
    val[i,j] = log_lik(v_alpha[i],v_mu[j])
  }
}

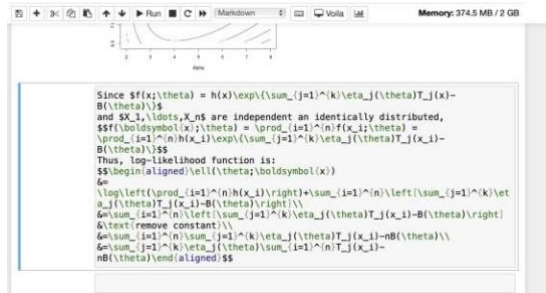
contour(x = v_alpha,
        y = v_mu,
        val,
        xlab= "Alpha",ylab="Mu")
```

b) Clicking the 'Run' button will give you the results below the code cell.

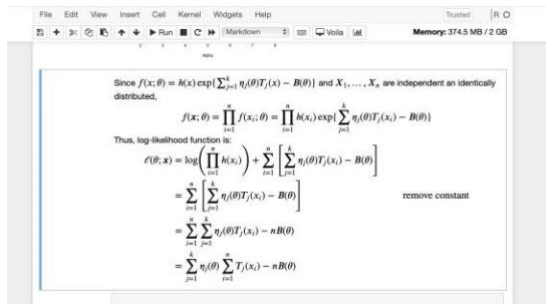


c) Markdown to write comment, text, latex code.

Ex:

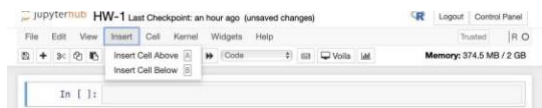


d) Similarly, clicking the "Run" button will give you the results of the markdown cell.

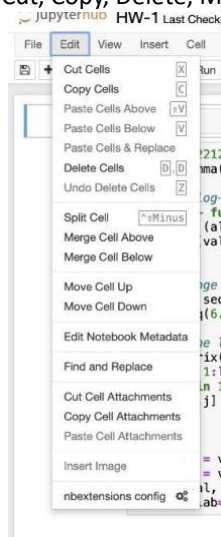


## Cell operations

1. To Insert Cell Above or Below, select 'Insert' and then the function.

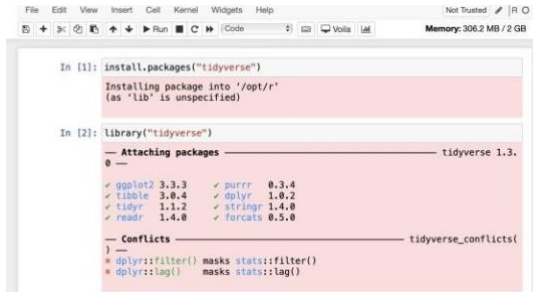


2. Cut, Copy, Delete, Merge, Move, Find and Replace under "Edit" button:



## Install package and Call

1. Installing packages and calling is the same as in R. However, you should remember that each time you log in, you need to reinstall the packages you need to use. This is different than you use the R studio in local. Ex (install tidyverse):



```
File Edit View Insert Call Kernel Widgets Help Not Trusted | R O
+ |< |> |> Run | Code | Volts |
Memory: 306.2 MB / 2 GB

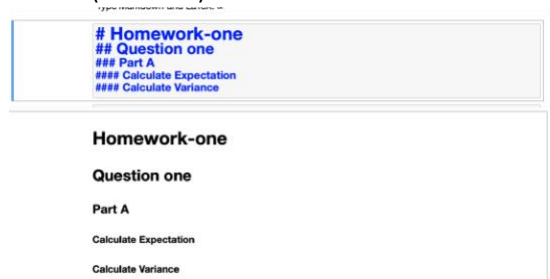
In [1]: install.packages("tidyverse")
Installing package into '/opt/r/'
(as 'lib' is unspecified)

In [2]: library("tidyverse")
Attaching packages: tidyverse 1.3.0
-
✔ ggplot2 3.3.3   ✔ purrr 0.3.4
✔ tibble 3.0.4   ✔ dplyr 1.0.2
✔ tidyr 1.1.2    ✔ stringr 1.4.0
✔ readr 1.4.0    ✔ forcats 0.5.0
-
Conflicts: tidyverse_conflicts()
-
* dplyr::filter() masks stats::filter()
* dplyr::lag() masks stats::lag()
```

## Headings

1. The headings starts with '#' i.e., hash symbol followed by the space, and there are six headings with the largest heading only using one hash symbol and the smallest titles using six hash symbols.

- # (Header 1, title)
- ## (Header 2, major headings) ###
- (Header 3, subheadings)
- #### (Header 4)
- ##### (Header 5)
- ##### (Header 6) Ex:



```
# Homework-one
## Question one
### Part A
#### Calculate Expectation
#### Calculate Variance
```

**Homework-one**

**Question one**

**Part A**

Calculate Expectation

Calculate Variance

## Bold and Italic Text

1. Three methods for Bold:
  - <b> bold text </b>
  - bold text**
  - bold text**
2. Three methods for Italic:
  - <i> italic text </i>

*\*italic text\**

\_italic text\_

Ex:

```
<b> bold text </b>
bold text
bold text
<i> italic text </i>
italic text
italic text
```

**bold text**  
**bold text**  
**bold text**  
*italic text*  
*italic text*  
*italic text*

## List

1. Ordered List: <ol>  
<li>High</li>  
<li>Median</li>  
<li>Low</li>  
</ol>
2. Unordered List: <ul>  
<li>High</li>  
<li>Median</li>  
<li>Low</li>  
</ul> Ex:

```
### Ordered List:
<ol>
<li>High</li>
<li>Median</li>
<li>Low</li>
</ol>

### Unordered List:
<ul>
<li>High</li>
<li>Median</li>
<li>Low</li>
</ul>
```

**Ordered List:**  
1. High  
2. Median  
3. Low

**Unordered List:**  
• High  
• Median  
• Low

## Colours

<font color=blue|red|green>Text</font> Ex:

```
## Colors:
### <font color=red>Part a</font>
<font color=red>use red colour</font>
### <font color=blue>Part b</font>
<font color=blue>use blue colour</font>
```

**Colors:**

**Part a**

use red colour

**Part b**

use blue colour

## Mathematical symbol

1. The mathematical symbol in Markdown is included in \$ mathematical expression goes here \$

Ex:  $f(x) = 1/x + e^x + \sqrt{2\pi x}$

```
$f(x) = \frac{1}{x} + e^x + \sqrt{(2\pi x)}$
```

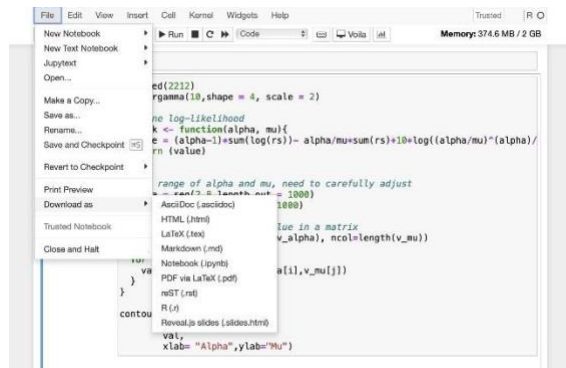
In [ ]:

$$f(x) = \frac{1}{x} + e^x + \sqrt{(2\pi x)}$$

In [ ]:

## Download in the notebook

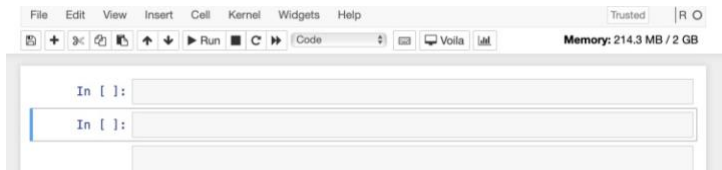
1. If you finish your notebook and want to download immediately, click the 'File' button and then 'Download as'. There are many options you can choose from such as {R(.r), PDF(.pdf), Notebook(.ipynb)}



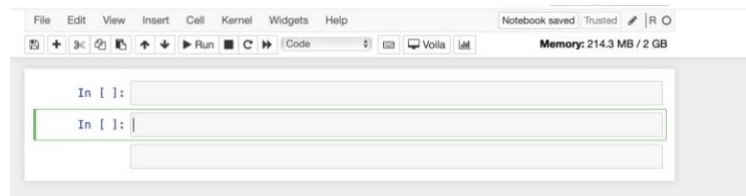
## Edit and Command mode

1. If a cell is active, there are two modes: If you just click in one cell, the cell is opened in **command mode** which is indicated by a blue border on the left:





2. **Edit mode** is entered if you click into the code area of that cell. This mode is indicated by a green border on the left side of the cell:



3. If you'd like to leave edit mode and return to command mode again you just need to hit ESC.
4. There are many functions which are available in command and in edit mode. You can open up the overview of keyboard shortcuts by using menu entry Help → Keyboard Shortcuts:

