



Current Topics in Bioinformatics

presented by the

Harvard Chan Bioinformatics Core

Workshop materials:

<https://hbctraining.github.io/Training-modules/>

HBC training team: hbctraining@hsph.harvard.edu

HBC consulting: bioinformatics@hsph.harvard.edu

Training

- **Basic Data Skills**
 - Introduction to **command line** (Unix) and **high-performance computing**
 - Introduction to **R**
- **Advanced Analyses of NGS Data**
 - Bulk RNA-seq
 - Single-cell RNA-seq
 - ChIP-seq
- Monthly, short workshops on various bioinformatics topics

Consulting

- **Transcriptomics:** RNA-seq, small RNA-seq, scRNA-Seq
- **Epigenetics:** ChIP-seq, genome-wide methylation, ATAC-Seq
- **DNA Variation:** WGS, resequencing, exome-seq and CNV studies
- **Functional enrichment** analysis
- **Exp. design help & grant support**

The 3 Window problem...

The screenshot illustrates the '3 Window problem' in RStudio, where three overlapping windows are visible:

- Top Window (Zoom):** Shows a video conference with three participants: Mary Piper (Co-host, me), Jihe Liu (Host), and Troubleshooter (Radhika) (Co-host). The status bar indicates 'You are viewing Jihe Liu's screen'.
- Bottom-Left Window (RStudio):** Shows the RStudio interface with the following code in the script editor:

```
483  
484  
485 getwd()  
486  
487 # square root function  
488 sqrt(81)  
489  
490 # round function  
491 round(3.14159)  
492 ?round  
493  
494  
495
```

The console shows the output of the round function:

```
> # round function  
> round(3.14159)  
[1] 3  
> ?round  
>
```

The environment pane shows the following values:

name	value
number	15
x	5
y	10

The bottom status bar shows 'mean of normalized counts'.
- Bottom-Right Window (RStudio):** Shows the RStudio documentation for the round function. The title is 'Rounding of Numbers'. The description states: 'ceiling takes a single numeric argument x and returns a numeric vector containing the smallest integers not less than the corresponding elements of x. floor takes a single numeric argument x and returns a numeric vector containing the largest integers not greater than the corresponding elements of x. trunc takes a single numeric argument x and returns a numeric vector containing the integers formed by truncating the values in x toward 0. round rounds the values in its first argument to the specified number of decimal places (default 0). See 'Details' about "round to even" when rounding off a 5. signif rounds the values in its first argument to the specified number of significant digits. Usage: ceiling(x), floor(x), trunc(x, ...)'.

The 3 Window problem...

The image illustrates the '3 Window problem' in a Zoom meeting. The Zoom window is in the foreground, showing participants Mary Piper, Troubleshooter, and Jihe Liu. Behind it, the RStudio window is visible, displaying a script editor with R code for the round function, a console with the output of the code, and a documentation pane for the round function. The RStudio window is also partially obscured by a smaller window titled 'Untitled1' which contains a list of R functions and their descriptions.

Zoom Participants (3):

- MP Mary Piper (Co-host)
- JL Jihe Liu (Host)
- T Troubleshooter (Radhika) (Co-host)

RStudio Script Editor:

```
483  
484  
485 getwd()  
486  
487 # square root function  
488 sqrt(81)  
489  
490 # round function  
491 round(3.14159)  
492 ?round  
493  
494  
495
```

RStudio Console:

```
> # round function  
> round(3.14159)  
[1] 3  
> ?round  
>
```

Untitled1 Window:

```
1 # Assignment operator  
2 x <- 3  
3  
4 # Functions  
5 getwd()  
6  
7 sqrt(81)  
8  
9 round(3.14159)  
10 ?round  
11
```

RStudio Environment:

Values
x 3

R Documentation: Rounding of Numbers

Description

ceiling takes a single numeric argument x and returns a numeric vector containing the smallest integers not less than the corresponding elements of x.

floor takes a single numeric argument x and returns a numeric vector containing the largest integers not greater than the corresponding elements of x.

trunc takes a single numeric argument x and returns a numeric vector containing the integers formed by truncating the values in x toward 0.

round rounds the values in its first argument to the specified number of decimal places (default 0). See 'Details' about "round to even" when rounding off a 5.

signif rounds the values in its first argument to the specified number of significant digits.

Usage

```
ceiling(x)  
floor(x)  
trunc(x, ...)
```

The 3 Window problem...

The screenshot illustrates the '3 Window problem' in RStudio, where the interface is divided into three windows, each with a different task. A red box highlights the RStudio interface, which is divided into three windows: a script editor, a console, and a web browser.

Script Editor (Left): Contains R code for rounding functions.

```
483  
484  
485 getwd()  
486  
487 # square root function  
488 sqrt(81)  
489  
490 # round function  
491 round(3.14159)  
492 ?round  
493  
494  
495
```

Console (Bottom Left): Shows the execution of the R code.

```
> # round function  
> round(3.14159)  
[1] 3  
> ?round  
>
```

Web Browser (Right): Displays the R documentation for the 'round' function.

Participants (Top Right): A list of participants in the video call.

- MP Mary Piper (Co-host, me)
- JL Jihe Liu (Host)
- T Troubleshooter (Radhika) (Co-host)

Environment (Top Right): A table showing the current environment.

Values
x
3

Files (Bottom Right): A list of files in the current directory.

Plots (Bottom Right): A list of plots in the current directory.

Packages (Bottom Right): A list of packages in the current directory.

Help (Bottom Right): A list of help topics in the current directory.

Viewer (Bottom Right): A list of viewer topics in the current directory.

Round (base)

Rounding of Numbers

Description

ceiling takes a single numeric argument x and returns a numeric vector containing the smallest integers not less than the corresponding elements of x.

floor takes a single numeric argument x and returns a numeric vector containing the largest integers not greater than the corresponding elements of x.

trunc takes a single numeric argument x and returns a numeric vector containing the integers formed by truncating the values in x toward 0.

round rounds the values in its first argument to the specified number of decimal places (default 0). See 'Details' about "round to even" when rounding off a 5.

signif rounds the values in its first argument to the specified number of significant digits.

Usage

```
ceiling(x)  
floor(x)  
trunc(x, ...)
```

The 3 Window problem...

You are viewing Jihe Liu's screen

Participants (3)

- MP Mary Piper (Co-host, me)
- JL Jihe Liu (Host)
- T Troubleshooter (Radhika) (Co-host)

```
483  
484  
485 getwd()  
486  
487 # square root function  
488 sqrt(81)  
489  
490 # round function  
491 round(3.14159)  
492 ?round  
493  
494  
495
```

Environment

Values

name	value
x	5
y	10

Files

Plots

Packages

Help

Viewer

R: Rounding of Numbers

Round (base)

R Documentation

Rounding of Numbers

Description

ceiling takes a single numeric argument x and returns a numeric vector containing the smallest integers not less than the corresponding elements of x.

floor takes a single numeric argument x and returns a numeric vector containing the largest integers not greater than the corresponding elements of x.

trunc takes a single numeric argument x and returns a numeric vector containing the integers formed by truncating the values in x toward 0.

round rounds the values in its first argument to the specified number of decimal places (default 0). See 'Details' about "round to even" when rounding off a 5.

signif rounds the values in its first argument to the specified number of significant digits.

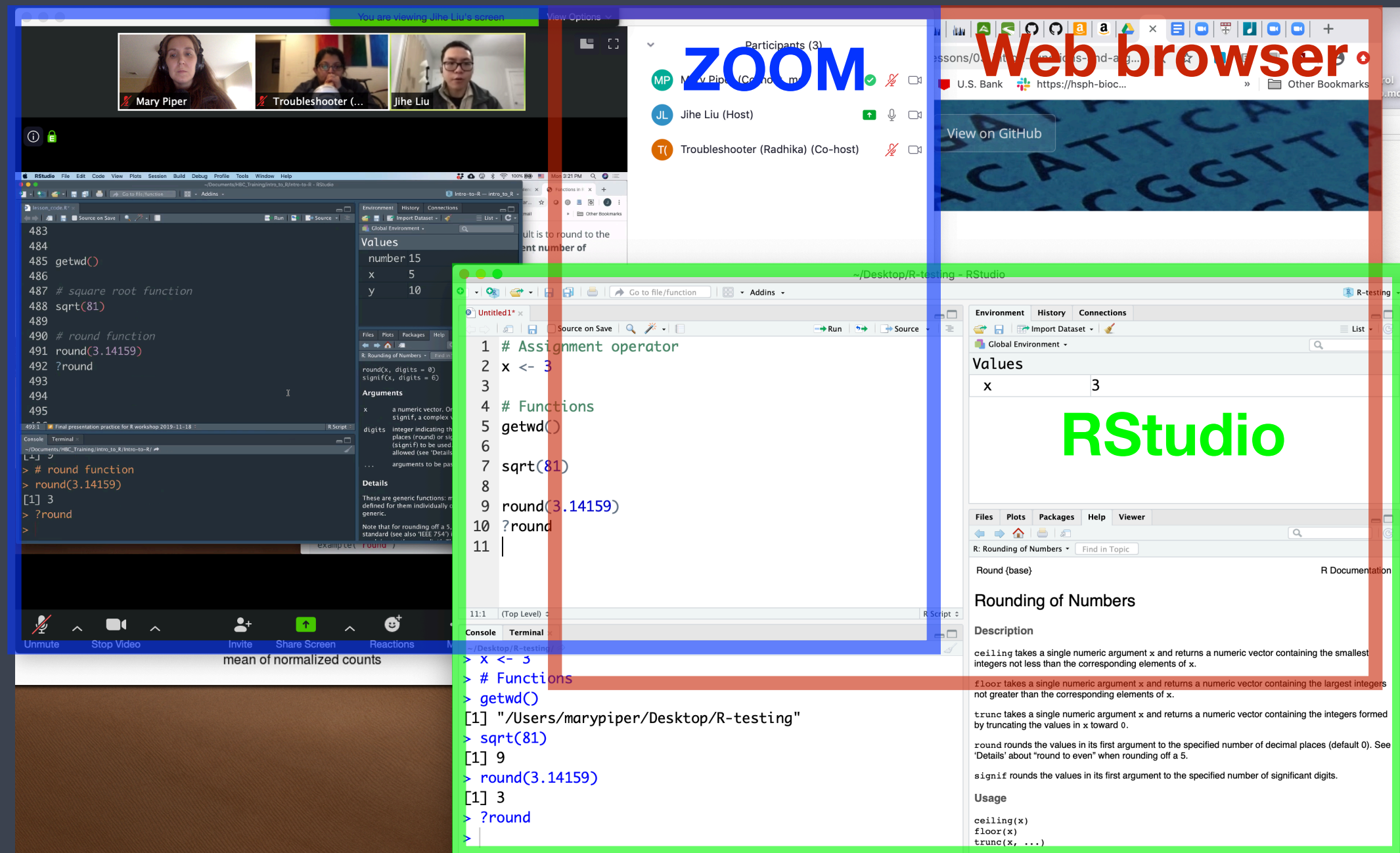
Usage

```
ceiling(x)  
floor(x)  
trunc(x, ...)
```

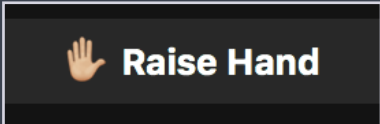
1 # Assignment operator
2 x <- 3
3
4 # Functions
5 getwd()
6
7 sqrt(81)
8
9 round(3.14159)
10 ?round
11

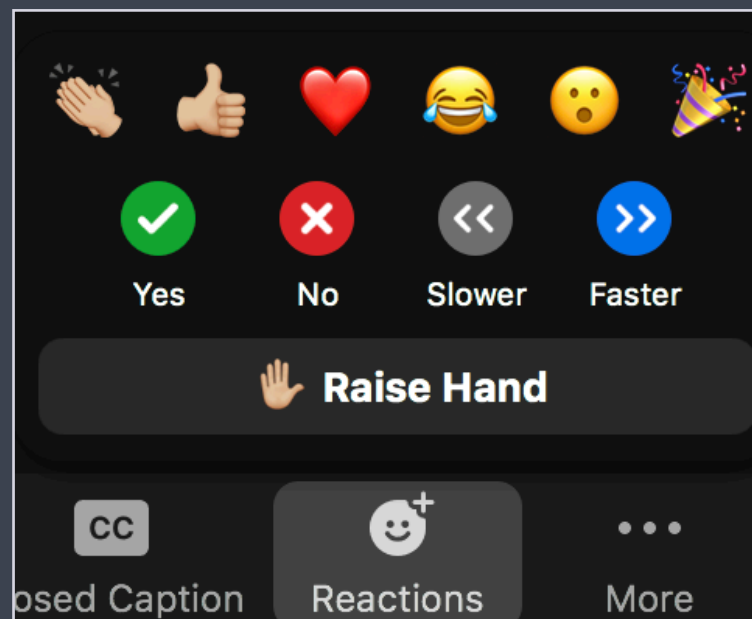
mean of normalized counts

The 3 Window problem...



Odds and Ends

- ❖ Quit/minimize all applications that are not required for class
- ❖ Are you all set?
 -  = "agree", "I'm all set" (equivalent to a **green post-it**)
 - Type "X" in chat = "disagree", "I'm not ready" (equivalent to a **red post-it**)



Odds and Ends

- ❖ Questions for the presenter?
 - Post in the chat window to Moderator
- ❖ Technical difficulties?
 - Open the chat window and start a private chat with the *Troubleshooter* with a description of the problem.

Upcoming HBC workshop & events

Upcoming workshops:

<http://bioinformatics.sph.harvard.edu/training/>

Exit Survey

<http://tinyurl.com/hbc-modules>