



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 a video conference. The screen is divided into three main sections:

- Top Left (Video Feed):** Shows three participants: Mary Piper (Co-host, me), Troubleshooter (...), and Jihe Liu (Host). Below the video feed is a control bar with buttons for Unmute, Stop Video, Invite, Share Screen, and Reactions.
- Top Right (Participants List):** A list of participants (3) with their names and status icons: Mary Piper (Co-host, me), Jihe Liu (Host), and Troubleshooter (Radhika) (Co-host).
- Bottom (RStudio IDE):** The RStudio interface is visible, showing the console, environment, and source editor. The console output shows the execution of R code:

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

The RStudio IDE is further divided into three windows:

- Source Editor:** Contains R code for an assignment operator and functions:

```
1 # Assignment operator
2 x <- 3
3
4 # Functions
5 getwd()
6
7 sqrt(81)
8
9 round(3.14159)
10 ?round
11
```
- Environment:** Shows the current environment with variables:

Variable	Value
x	3
- Viewer:** Displays the R documentation for the `round` function, titled "Rounding of Numbers". It includes a description of the function, its usage, and examples.

The 3 Window problem...

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  
>
```

RStudio Documentation Pane

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 focus. 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. The code is as follows:

```
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 code in the script editor. The output is as follows:

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

Web Browser (Right): Displays the R 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, ...)'.

Participants (Top Right): A list of participants in the video call, including Mary Piper (Co-host, me), Jihe Liu (Host), and Troubleshooter (Radhika) (Co-host).

Web Browser (Top Right): A web browser window showing a search for 'Web browser' and a link to 'View on GitHub'.

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
number	15
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, ...)
```

~/Desktop/R-testing - RStudio

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

Console

```
> x <- 3  
> # Functions  
> getwd()  
[1] "/Users/mariyaper/Desktop/R-testing"  
> sqrt(81)  
[1] 9  
> round(3.14159)  
[1] 3  
> ?round
```

mean of normalized counts

The 3 Window problem...

Zoom

Participants (3)

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

Web browser

U.S. Bank <https://hsph-bioc...> Other Bookmarks

View on GitHub

RStudio

```
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 History Connections

Global Environment

Values

x
3

Files Plots Packages Help Viewer

R: Rounding of Numbers Find in Topic

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

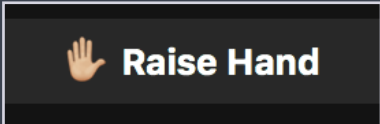
```
ceiling(x)  
floor(x)  
trunc(x, ...)
```

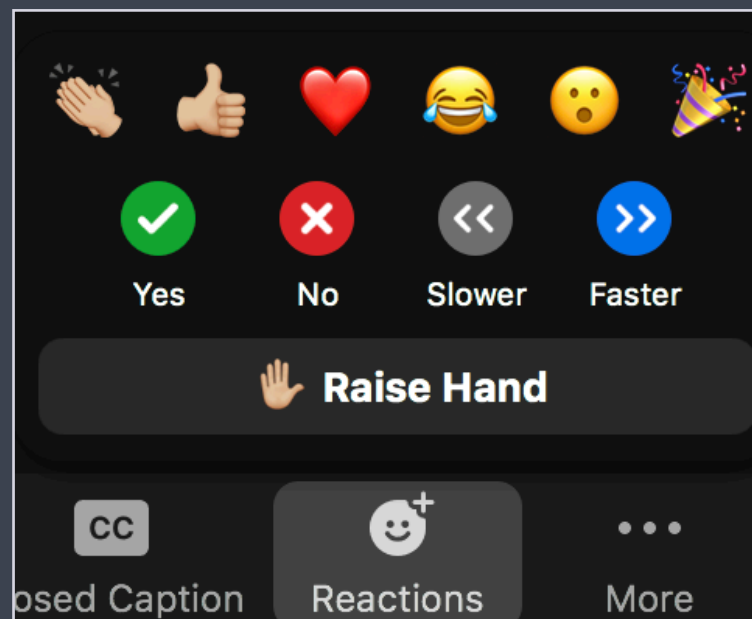
mean of normalized counts

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

```
> x <- 3  
> # Functions  
> getwd()  
[1] "/Users/mariypper/Desktop/R-testing"  
> sqrt(81)  
[1] 9  
> round(3.14159)  
[1] 3  
> ?round
```

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/>