

SHOW & TELL

R Functions & ICPlutilities



504
gcb





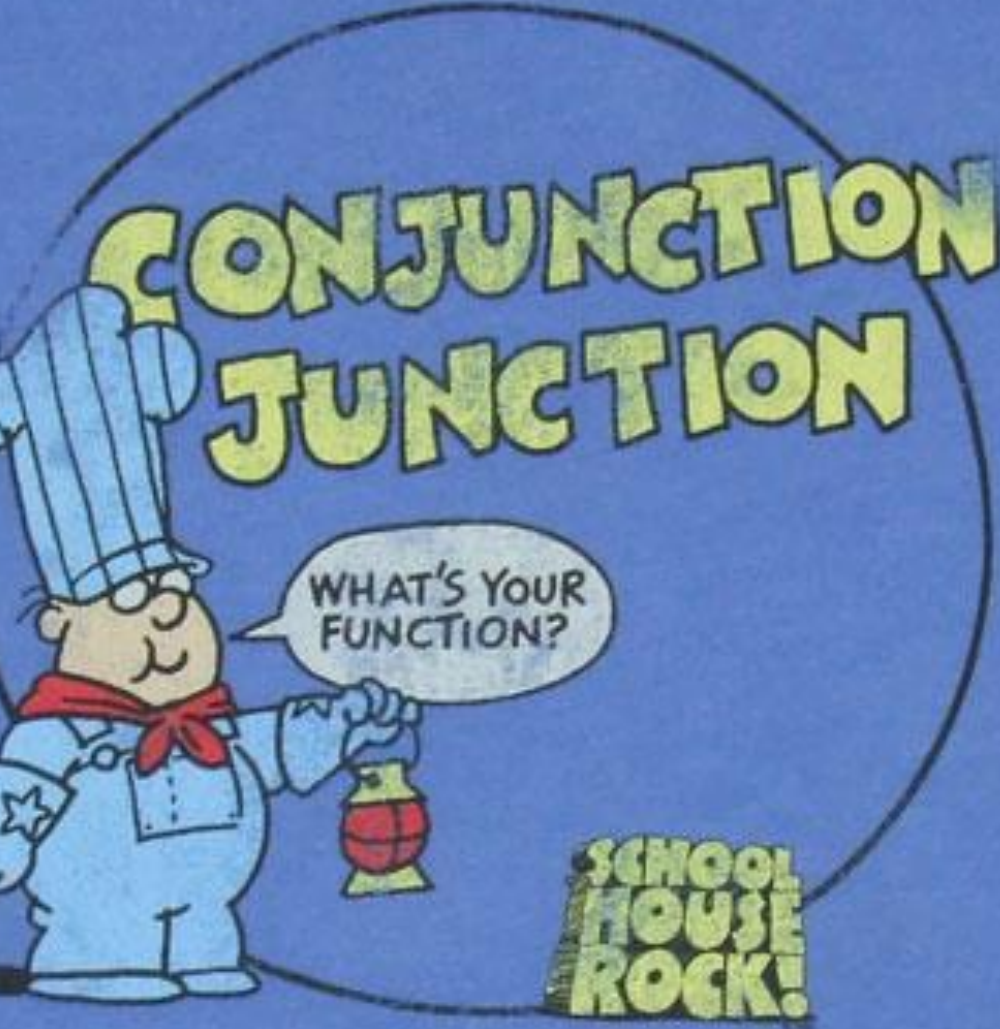
ON AIR

**You can
watch/listen to a
recording of this
presentation at the
following link**

pepfar.adobeconnect.com/p06rhwiylszh



github.com/ICPI/ICPlutilities

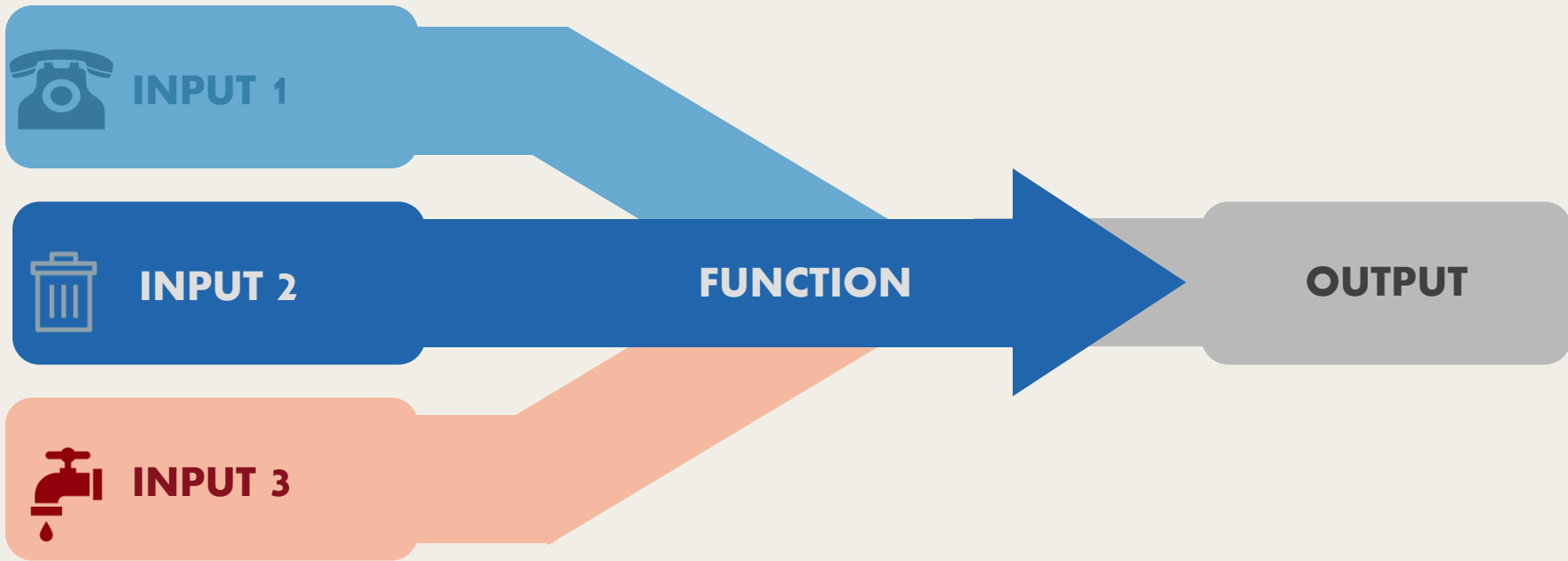


PURPOSE:

Discuss what R functions are and how to take advantage of custom made functions and packages



**What is a
function?**



**What is a
function?**

```
b_fcn <- function (arguments) {  
  #cool things  
}
```



**Example
R function**

function name



formals()/arguments



```
b_fcn <- function (x) {  
  x + 1  
}
```

← body()

running the function



```
> b_fcn(10)  
[1] 11
```

← output



**Example
R function**

answer_to_the_universe.R



**Why use
a function?**

answer_to_the_universe.R



avoid repeated
code blocks



Why use
a function?

answer_to_the_universe.R

```
library(tidyverse)
# ...
# ...
# ...
```

```
library(tidyverse)
# ...
# ...
# ...
# ...
# ...
# ...
# ...
# ...
# ...
```

```
library(tidyverse)
# ...
# ...
# ...
```

```
library(tidyverse)
```

avoid repeated
code blocks

```
library(tidyverse) {
  # ...
  # ...
  # ...
}
```



**Why use
a function?**

answer_to_the_universe.R

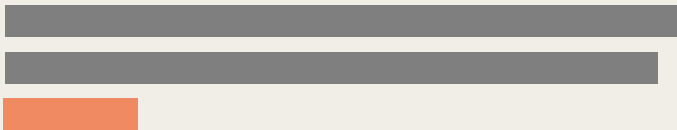
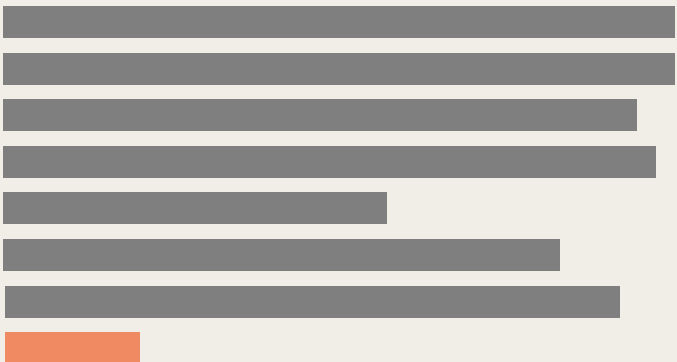
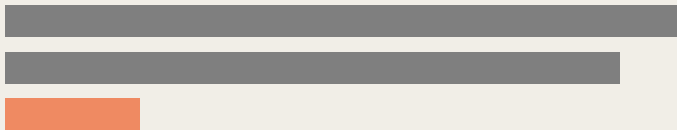


minimize missing
error fixes

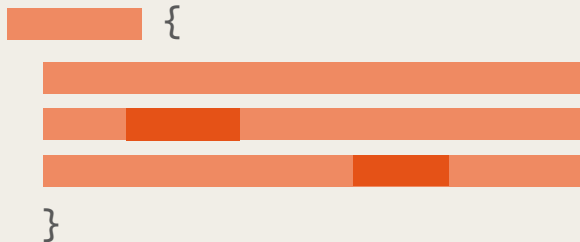


Why use
a function?

answer_to_the_universe.R



minimize missing
error fixes

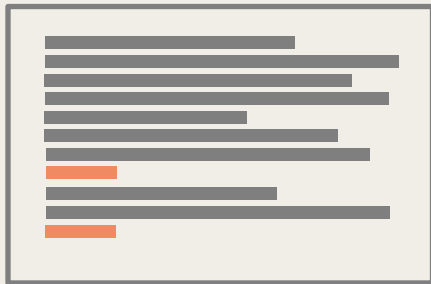


Why use
a function?

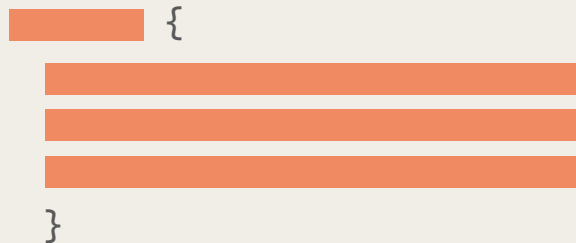
answer_to_the_universe.R



suxnet.R



reuse function
elsewhere



Why use
a function?



**What is a
package?**



“In R, the fundamental unit of shareable code is the package. **A package bundles together code, data, documentation, and tests, and is easy to share with others.** As of January 2015, there were over 6,000 packages available on the Comprehensive R Archive Network, or CRAN, the public clearing house for R packages” – Wickham, R Packages (2015)



What is a package?



dplyr

summarize()
mutate()
count()
n()
n_distinct()
group_by()
left_join()
right_join()
inner_join()
full_join()
bind_rows()
bind_columns()
lead()
lag()
ntile()
first()
last()
nth()



**What is a
package?**

pacman

crayon

dp1yr

roxygen2

curl

foreign

jsonlite

readr

ggplot2

testthat

tibble

devtools

data.table



**What is a
package?**



**Create and
customize
your own
packages**



**Where do
packages
live?**



WATER WORKS

If one Utility is owned,
rent is 4 times amount
show on dice.

If all Utilities are owned, rent
is 10 times amount show on
dice



ELECTRIC COMPANY

If one Utility is owned,
rent is 4 times amount
show on dice.

If all Utilities are owned, rent
is 10 times amount show on
dice



ICPI UTILITIES

If one Utility is owned,
rent is 4 times amount
show on dice.

If all Utilities are owned, rent
is 10 times amount show on
dice



```
install.packages("devtools")  
devtools::install_github(  
  "ICPI/ICPUtilities")
```



**Install and
update**

ICPUtilities



`read_msd()`



`rename_official()`



`add_cumulative()`



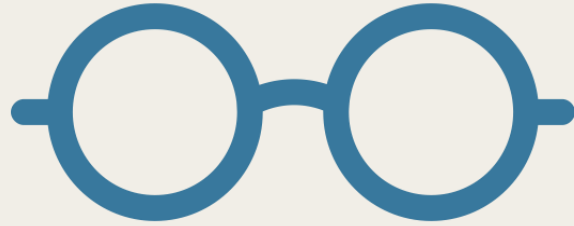
`identifypd()`



`combine_netnew()`



`add_color()`



read_msd()



**Package
contents**

Variable and function names should be lowercase. Use an underscore (_) to separate words within a name.

Generally, variable names should be nouns and function names should be verbs. Strive for names that are concise and meaningful (this is not easy!).

– Wickham, R Packages (2015)





rename_official()



**Package
contents**

mechanismid	primepartner	implementingmechanismname	FY16	FY17	FY18
82717	TBD	TBD	100		
82717	Dev. Inc.	Broad Suport		529	
82717	Dev. Inc.	Broad Support			482



rename_official()



mechanismid	primepartner	implementingmechanismname	FY16	FY17	FY18
82717	Dev. Inc.	Broad Support	100	529	482



`add_cumulative()`



**Package
contents**

indicator	FY17Q4	FY17APR	FY18 Targets	FY18Q1	FY18Q2
TX_NEW	100	300	500	90	100
TX_CURR	400	400	600	425	490
HTS_TST	850	2,000	3,500	900	850



add_cumulative()



indicator	FY17Q4	FY17APR	FY18 Targets	FY18Q1	FY18Q2	FY18 Cum.
TX_NEW	100	300	500	90	100	190
TX_CURR	400	400	600	425	490	490
HTS_TST	850	2,000	3,500	900	850	1,750



identifypd()



**Package
contents**

indicator	FY17APR	FY18 Targets	FY18Q1	FY18Q2	FY18 Cum	FY19 Targets
TX_NEW	300	500	90	100	100	650
TX_CURR	400	600	425	490	490	800
HTS_TST	2,000	3,500	900	850	850	3,800

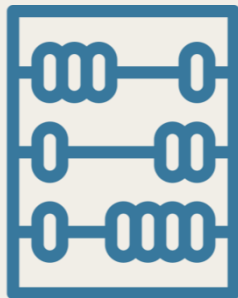


identifypd()



```
identifypd(df)  
> "FY2018Q2"
```

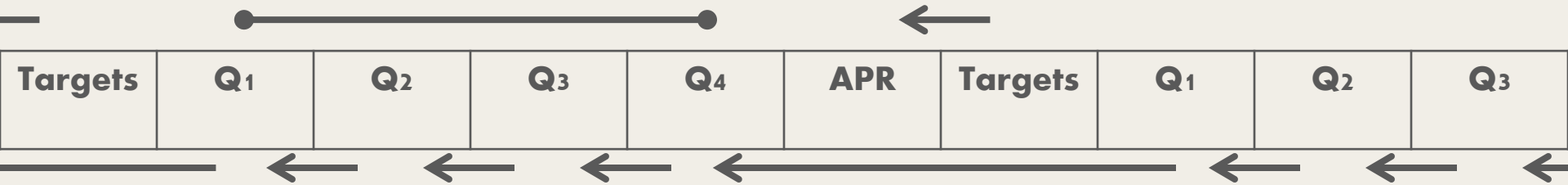
```
identifypd(df, "year")  
> 2018
```



combine_netnew()



**Package
contents**



manually update, add new quarter to bottom

$$fy2017q2 = fy2017q2 - fy2017q1$$

$$fy2017q3 = fy2017q3 - fy2017q2$$

$$fy2017q4 = fy2017q4 - fy2017q3$$

$$fy2017apr = fy2017q1 + fy2017q2 + fy2017q3 + fy2017q4$$

$$fy2018_targets = fy2018targets - fy2017apr$$

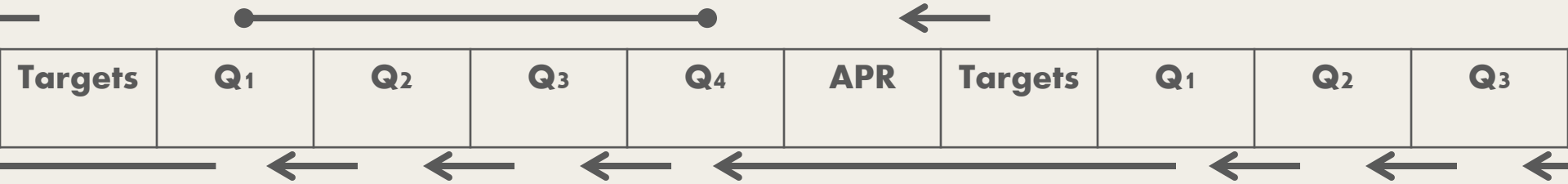
$$fy2018q1 = fy2018q1 - fy2017q4$$

$$fy2018q2 = fy2018q2 - fy2017q3$$



**Calculate
Net New**

combine_netnew()



manually update, add new quarter to bottom

fy201

fy201

fy201

fy201

fy201

fy201

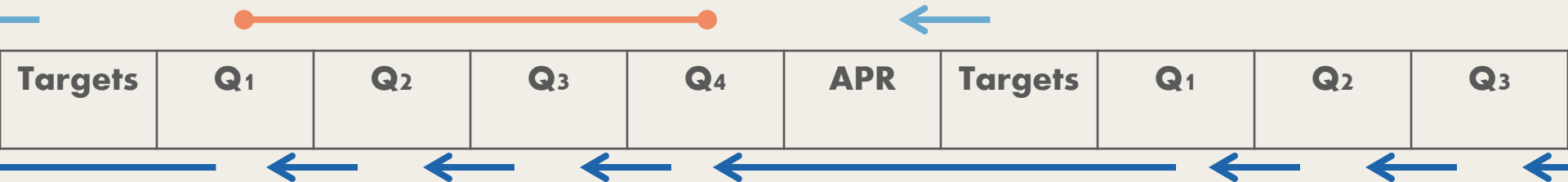
fy201

**Difficult calculation since
each period is its own
indicator and the
calculations are not uniform**

fy2017q3 + fy2017q4
fy2017apr



**Calculate
Net New**



manually update, add new quarter to bottom

$fy2017q2 = fy2017q2 - fy2017q1$

$fy2017q3 = fy2017q3 - fy2017q2$

$fy2017q4 = fy2017q4 - fy2017q3$

$fy2017apr = fy2017q1 + fy2017q2 + fy2017q3 + fy2017q4$

$fy2018_targets = fy2018targets - fy2017apr$

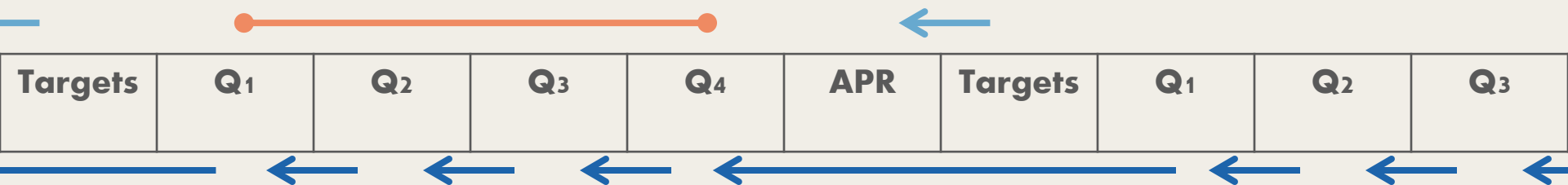
$fy2018q1 = fy2018q1 - fy2017q4$

$fy2018q2 = fy2018q2 - fy2017q3$



**Calculate
Net New**

combine_netnew()



3 generic functions

1. Quarter = qtr_curr - qtr_last

2. APR = qtr_all

3. Target = tgt_curr - apr_last



**Calculate
Net New**

3 generic functions

1. Quarter = qtr_curr - qtr_last

2. APR = qtr_all

3. Target = tgt_curr - apr_last

df_quarter
period

FY ₁₇ Q ₁
FY ₁₇ Q ₂
FY ₁₇ Q ₃
FY ₁₇ Q ₄
FY ₁₈ Q ₁
FY ₁₈ Q ₂

df_apr
period

FY ₁₇
FY ₁₈

df_targets
period

FY ₁₇ _Targets
FY ₁₇ Q ₄
FY ₁₈ _Targets

**Calculate
Net New**



`add_color()`



**Package
contents**

ICPI COLOR PALETTE HEX



— Autumn Woods —



sapphire ice
#335B8E



mint
#6CA18F



dark khaki
#B5B867



ubuntu
#CC5234



amazon
#D9812C



grullo
#948D79

— Coast of Bohemia —



denim
#2166AC



moonstone blue
#67A9CF



beau blue
#D1E5F0



cornell red
#B2182B



salmon
#EF8A62



unbleached silk
#FDDBC7

— Tidepools —



vegas gold
#CEB966



olivine
#9CB084



dark sky blue
#6BB1C9



cornflower blue
#6585CF



toolbox
#7E6BC9



rich lilac
#A379BB

— By the Power of Grayscale —



bone
#DDDDDD



bleakers knop
#B2B2B2



ford gray
#969696



battleship gray
#808080



dim gray
#5F5F5F



black swan
#4D4D4D

ICPUtilities



`read_msd()`



`rename_official()`



`add_cumulative()`



`identifypd()`



`combine_netnew()`



`add_color()`

Code Issues 0 Pull requests 0 Projects 0 Wiki Insights Settings

Filters is:issue is:open

Labels

Milestones

New issue

Code Issues 0 Pull requests 0 Projects 0 Wiki Insights Settings

Filters is:pr is:open

Labels

Milestones

New pull request



How do I
contribute?

SHOW & TELL

R Functions & ICPlutilities



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- **ICPlutilities (Chafetz)** github.com/ICPI/ICPlutilities
- **R packages (Wickam)** r-pkgs.had.co.nz/r.html
- **Functions (FitzJohn)** nicercode.github.io/guides/functions/
- **A Tutorial on Using Functions in R! (Fanara)**
datacamp.com/community/tutorials/functions-in-r-a-tutorial
- **Writing an R package from scratch (Parker)**
hilaryparker.com/2014/04/29/writing-an-r-package-from-scratch/
- **An Introduction to R: Writing Your Own Function (CRAN)** cran.r-project.org/doc/manuals/R-intro.html#Writing-your-own-functions



Resources



Notes and Attribution

- Prepared for the ICPI/DIV “Show and Tell” on “R Functions & ICPIutilities” (DC), Aug 2, 2018
- Image Sources
 - Icons from the Noun Project - Light by Numero Uno, Plug by Atif Arshad, Water Faucet by Yazmin Alanis, Trash by Juan Carlos Altamirano, Phone by Aisyah, TV by Creative Stall, eyeglasses by allex, edit by ISRAA ALI, sum by Trevor Dsouza, Time by lastspark, Abacus by lastspark, paint by Nabilauzwa, Computer by Yorlmar Campos
 - School House Rock! - <http://medialoper.com/certain-songs-688-jack-sheldon-feat-terry-morel-mary-sue-berry-conjunction-junction/>
 - Package Emoji - <http://www.iemoji.com/view/emoji/742/objects/package>
 - Cat in a Box - <https://www.adventurecats.org/indoor-adventures/indoor-adventure-cat/>

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