

# Foundations of R Software

## Lecture 36

### Strings – Display and Formatting

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### Print and Format with Concatenate

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# Formatting and Display of Strings

Suppose we want to print

The zero occurs at  $2\pi$  radians.

# Formatting and Display of Strings

The `print` function has a significant limitation that it prints only one object at a time.

Trying to print multiple items gives error message:

```
> print("The zero occurs at", 2*pi, "radians.")  
Error in print.default("The zero occurs at", 2 *  
pi, "radians.") :   invalid 'quote' argument
```

R Console

```
> print("The zero occurs at", 2*pi, "radians.")  
Error in print.default("The zero occurs at", 2 * pi, "radians.") :  
  invalid 'quote' argument
```

# Formatting and Display of Strings

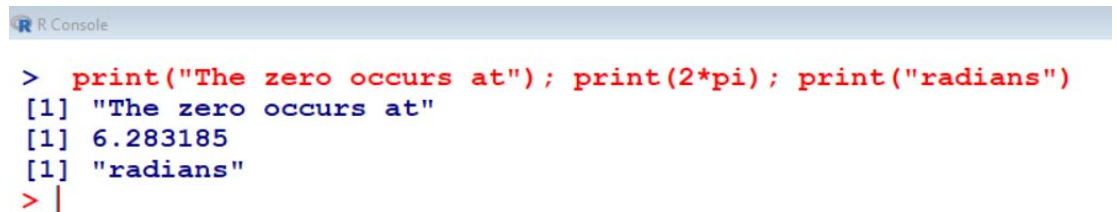
The only way to print multiple items is to print them one at a time

```
> print("The zero occurs at"); print(2*pi);  
print("radians")
```

```
[1] "The zero occurs at"
```

```
[1] 6.283185
```

```
[1] "radians"
```



```
R Console  
> print("The zero occurs at"); print(2*pi); print("radians")  
[1] "The zero occurs at"  
[1] 6.283185  
[1] "radians"  
> |
```

The **cat** function is an alternative to print that lets you combine multiple items into a continuous output.

## Formatting and Display of Strings : cat function

- The function `cat()` concatenate (link in the same sequence) and print the arguments in strings, concatenates them and prints the entire string in the command window.
- `cat` is useful for producing output in user-defined functions.
- It converts its arguments to character vectors, link them together in the same sequence to a single character vector, appends the given `sep = string(s)` to each element and then outputs them.

# Formatting and Display of Strings : cat function

## Usage

```
cat(... )
```

```
cat(... , file = "", sep = " ", fill = FALSE,  
labels = NULL, append = FALSE)
```

**cat** puts a space between each item by default.

One must provide a newline character (**\n**) (newline) to terminate the line.

## Formatting and Display of Strings : cat function

**fill** : a logical or (positive) numeric controlling how the output is broken into successive lines. If **FALSE** (default), only newlines created explicitly by **"\n"** are printed. Otherwise, the output is broken into lines with print width equal to the option width if fill is **TRUE**, or the value of fill if this is numeric. Non-positive fill values are ignored, with a warning.

**labels** : character vector of labels for the lines printed. Ignored if fill is **FALSE**.

**append** : logical. Only used if the argument file is the name of file. If **TRUE** output will be appended to file; otherwise, it will overwrite the contents of file.

# Formatting and Display of Strings: print vs cat

The only way to print multiple items is to print them one at a time

```
> print("The zero occurs at"); print(2*pi);  
print("radians")  
[1] "The zero occurs at"  
[1] 6.283185  
[1] "radians"
```

The `cat` function is an alternative to print that lets you combine multiple items into a continuous output:

```
> cat("The zero occurs at", 2*pi, "radians.",  
"\n")  
The zero occurs at 6.283185 radians.
```

# Formatting and Display of Strings

R Console

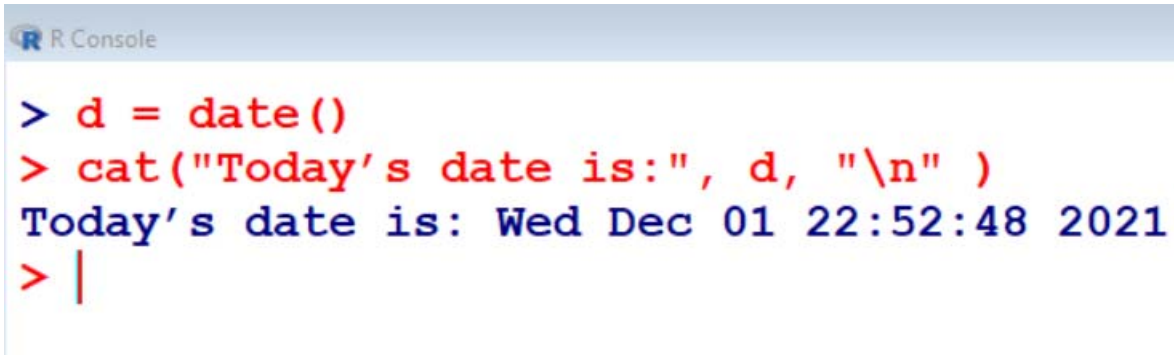
```
> print("The zero occurs at"); print(2*pi); print("radians")
[1] "The zero occurs at"
[1] 6.283185
[1] "radians"
>
> cat("The zero occurs at", 2*pi, "radians.", "\n")
The zero occurs at 6.283185 radians.
```

# Formatting and Display of Strings

```
> d = date()
```

```
> cat("Today's date is:", d, "\n" )
```

```
Today's date is: Wed Dec 01 22:52:48 2021
```

A screenshot of an R console window. The title bar says "R Console". The console shows the following text: the command "> d = date()" in red, followed by "> cat('Today's date is:', d, '\n' )" in red, then the output "Today's date is: Wed Dec 01 22:52:48 2021" in blue, and finally a red prompt "> |" with a vertical cursor.

```
R Console  
  
> d = date()  
> cat("Today's date is:", d, "\n" )  
Today's date is: Wed Dec 01 22:52:48 2021  
> |
```

**[Please note this is the time at the time or preparation of slide]**

## Formatting and Display of Strings

```
> x = 1:10
```

```
> x
```

```
[1]  1  2  3  4  5  6  7  8  9 10
```

```
> cat(x, sep = " ++ ")
```

```
1 ++ 2 ++ 3 ++ 4 ++ 5 ++ 6 ++ 7 ++ 8 ++ 9 ++ 10
```

```
> cat("\n")    # This is used to change the line
```

```
> cat(x, sep = " / ")
```

```
1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10
```

# Formatting and Display of Strings

R Console

```
> x = 1:10
> x
[1] 1 2 3 4 5 6 7 8 9 10
> cat(x, sep = " ++ ")
1 ++ 2 ++ 3 ++ 4 ++ 5 ++ 6 ++ 7 ++ 8 ++ 9 ++ 10>
> cat("\n")

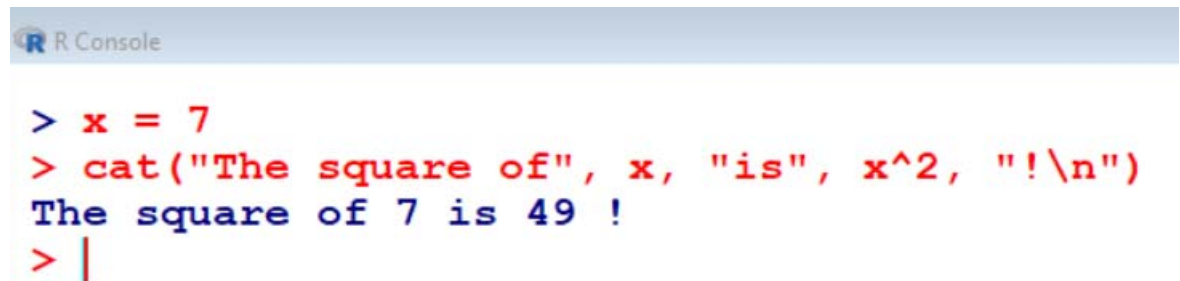
>
> cat(x, sep = " / ")
1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10> |
```

# Formatting and Display of Strings

```
> x = 7
```

```
> cat("The square of", x, "is", x^2, "!\n")
```

The square of 7 is 49 !

A screenshot of an R console window. The title bar at the top says "R Console". The console shows the following text: the prompt ">" followed by "x = 7" on the first line; the prompt ">" followed by "cat('The square of', x, 'is', x^2, '!\n')" on the second line; the output "The square of 7 is 49 !" on the third line; and the prompt ">" followed by a vertical bar "|" on the fourth line, indicating the cursor is ready for the next command.

```
R Console  
  
> x = 7  
> cat("The square of", x, "is", x^2, "!\n")  
The square of 7 is 49 !  
> |
```

# Formatting and Display of Strings

```
> cat("The square root of",x,"is  
approximately", format(sqrt(x),digits=3), "\n")
```

The square root of 7 is approximately 2.65

R Console

```
> cat("The square root of",x,"is approximately", format(sqrt(x),digits=3), "\n")  
The square root of 7 is approximately 2.65
```

# Formatting and Display of Strings

The `cat` function can also print simple vectors

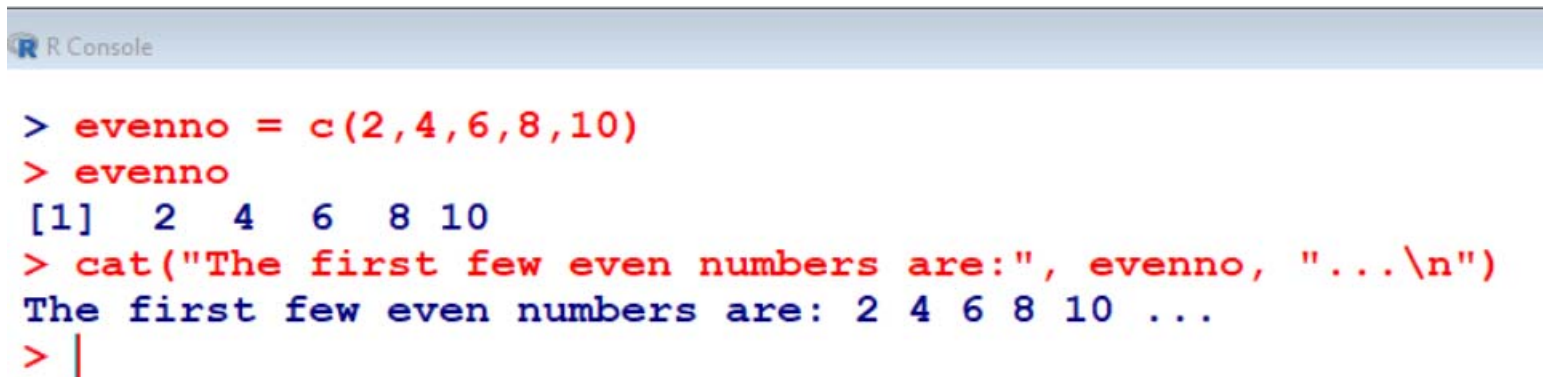
```
> evenno = c(2,4,6,8,10)
```

```
> evenno
```

```
[1]  2  4  6  8 10
```

```
> cat("The first few even numbers are:",  
evenno, "...\\n")
```

```
The first few even numbers are: 2 4 6 8 10 ...
```

A screenshot of an R console window with a light blue header bar containing the R logo and the text "R Console". The console shows the same R code and output as the previous blocks, with the prompt character ">" at the end of the last line.

```
> evenno = c(2,4,6,8,10)  
> evenno  
[1]  2  4  6  8 10  
> cat("The first few even numbers are:", evenno, "...\\n")  
The first few even numbers are: 2 4 6 8 10 ...  
> |
```

# Formatting and Display of Strings

```
> x = 1:10
```

```
> x
```

```
[1]  1  2  3  4  5  6  7  8  9 10
```

```
> cat(x, fill = 2, labels = paste("(", letters[1:10], "):"))
```

```
( a ): 1
```

```
( b ): 2
```

```
( c ): 3
```

```
( d ): 4
```

```
( e ): 5
```

```
( f ): 6
```

```
( g ): 7
```

```
( h ): 8
```

```
( i ): 9
```

```
( j ): 10
```