R Base Plot Line with Curves and Scatter

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Contents

1 Plot Curve, Line and Points

Go to the **RMD**, **R**, **PDF**, or **HTML** version of this file. Go back to fan's REconTools Package, R Code Examples Repository (bookdown site), or Intro Stats with R Repository (bookdown site).

Work with the R plot function.

1.1 One Point, One Line and Two Curves

- r curve on top of plot
- r plot specify pch lty both scatter and line
- r legend outside

Jointly plot:

- 1 scatter plot
- 1 line plot
- 2 function curve plots

```r
#####################################################
# First, Some common Labels:
#####################################################
# Labeling
st_title <- paste0('Scatter, Line and Curve Joint Ploting Example Using Base R\n',
                   'plot() + curve(): x*sin(x), cos(x), sin(x)*cos(x), sin(x)+tan(x)+cos(x)')
st_subtitle <- paste0('https://fanwangecon.github.io/',
                      'R4Econ/tabgraph/inout/htmlpdfr/fs_base_curve.html')
st_x_label <- 'x'
st_y_label <- 'f(x)'

#####################################################
# Second, Generate the Graphs Functions and data points:
#####################################################
# x only used for Point 1 and Line 1
x <- seq(-1*pi, 1*pi, length.out=25)
# Line (Point) 1: Generate X and Y
y1 <- x*sin(x)
st_point_1_y_legend <- 'x*sin(x)'
# Line 2: Line Plot
```

```r
y2 <- cos(x)
st_line_2_y_legend <- 'cos(x)'
# Line 3: Function
fc_sin_cos_diff <- function(x) sin(x)*cos(x)
st_line_3_y_legend <- 'sin(x)*cos(x)'
# Line 4: Function
fc_sin_cos_tan <- function(x) sin(x) + cos(x) + tan(x)
st_line_4_y_legend <- 'sin(x) + tan(x) + cos(x)'

#########################################################
# Third, set:
# - point shape and size: *pch* and *cex*
# - line type and width: *lty* and *lwd*
#########################################################
# http://www.sthda.com/english/wiki/r-plot-pch-symbols-the-different-point-shapes-available-in-r
# http://www.sthda.com/english/wiki/line-types-in-r-lty
# for colors, see: https://fanwangecon.github.io/M4Econ/graph/tools/fs_color.html
st_point_1_blue <- rgb(57/255,106/255,177/255)
st_line_2_red <- rgb(204/255, 37/255, 41/255,)
st_line_3_black <- 'black'
st_line_4_purple <- 'orange'

# point type
st_point_1_pch <- 10
# point size
st_point_1_cex <- 2

# line type
st_line_2_lty <- 'dashed'
st_line_3_lty <- 'dotted'
st_line_4_lty <- 'dotdash'
# line width
st_line_2_lwd <- 3
st_line_3_lwd <- 2.5
st_line_4_lwd <- 3.5

#########################################################
# Fourth: Share xlim and ylim
#########################################################
ar_xlim = c(min(x), max(x))
ar_ylim = c(-3.5, 3.5)

#########################################################
# Fifth: the legend will be long, will place it to the right of figure,
#########################################################
par(new=FALSE, mar=c(5, 4, 4, 10))

#########################################################
# Sixth, the four objects and do not print yet:
#########################################################
# pdf(NULL)
# Graph Scatter 1
plot(x, y1, type="p",
```

```r
    col = st_point_1_blue,
    pch = st_point_1_pch, cex = st_point_1_cex,
    xlim = ar_xlim, ylim = ar_ylim,
    panel.first = grid(),
    ylab = '', xlab = '', yaxt='n', xaxt='n', ann=FALSE)
pl_scatter_1 <- recordPlot()

# Graph Line 2
par(new=T)
plot(x, y2, type="l",
    col = st_line_2_red,
    lwd = st_line_2_lwd, lty = st_line_2_lty,
    xlim = ar_xlim, ylim = ar_ylim,
    ylab = '', xlab = '', yaxt='n', xaxt='n', ann=FALSE)
pl_12 <- recordPlot()

# Graph Curve 3
par(new=T)
curve(fc_sin_cos_diff,
    col = st_line_3_black,
    lwd = st_line_3_lwd, lty = st_line_3_lty,
    from = ar_xlim[1], to = ar_xlim[2], ylim = ar_ylim,
    ylab = '', xlab = '', yaxt='n', xaxt='n', ann=FALSE)
pl_123 <- recordPlot()

# Graph Curve 4
par(new=T)
curve(fc_sin_cos_tan,
    col = st_line_4_purple,
    lwd = st_line_4_lwd, lty = st_line_4_lty,
    from = ar_xlim[1], to = ar_xlim[2], ylim = ar_ylim,
    ylab = '', xlab = '', yaxt='n', xaxt='n', ann=FALSE)
pl_1234 <- recordPlot()
# invisible(dev.off())

#########################################################
# Seventh, Set Title and Legend and Plot Jointly
#########################################################
# CEX sizing Contorl Titling and Legend Sizes
fl_ces_fig_reg = 1
fl_ces_fig_small = 0.75

# R Legend
title(main = st_title, sub = st_subtitle, xlab = st_x_label, ylab = st_y_label,
    cex.lab=fl_ces_fig_reg,
    cex.main=fl_ces_fig_reg,
    cex.sub=fl_ces_fig_small)
axis(1, cex.axis=fl_ces_fig_reg)
axis(2, cex.axis=fl_ces_fig_reg)
grid()

# Legend sizing CEX
legend("topright",
```

```
        inset=c(-0.4,0),
        xpd=TRUE,
        c(st_point_1_y_legend, st_line_2_y_legend, st_line_3_y_legend, st_line_4_y_legend),
        col = c(st_point_1_blue, st_line_2_red, st_line_3_black, st_line_4_purple),
        pch = c(st_point_1_pch, NA, NA, NA),
        cex = fl_ces_fig_small,
        lty = c(NA, st_line_2_lty, st_line_3_lty, st_line_4_lty),
        lwd = c(NA, st_line_2_lwd, st_line_3_lwd,st_line_4_lwd),
        title = 'Legends',
        y.intersp=2)
```

Scatter, Line and Curve Joint Ploting Example Using Base R
plot() + curve(): x*sin(x), cos(x), sin(x)*cos(x), sin(x)+tan(x)+cos(x)
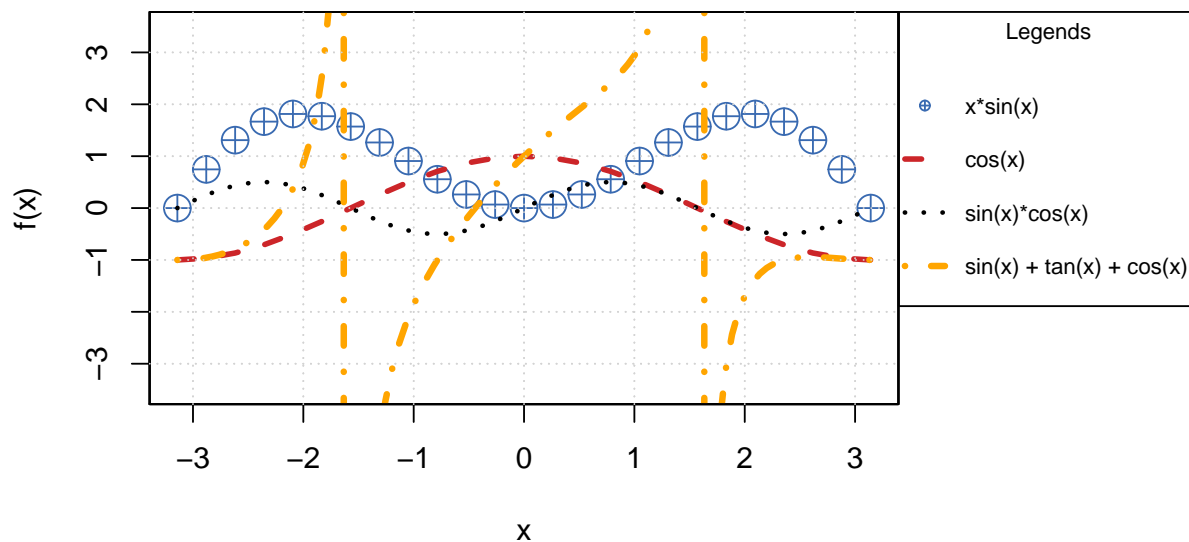
https://fanwangecon.github.io/R4Econ/tabgraph/inout/htmlpdfr/fs_base_curve.html

```
# record final plot
pl_1234_final <- recordPlot()
```

We used recordplot() earlier. So now we can print just the first two constructed plots.

```
#########################################################
# Eighth, Plot just the first two saved lines
#########################################################
# mar: margin, bottom, left, top, right
pl_12
# R Legend
par(new=T)
title(main = st_title, sub = st_subtitle, xlab = st_x_label, ylab = st_y_label,
      cex.lab = fl_ces_fig_reg,
      cex.main = fl_ces_fig_reg,
      cex.sub = fl_ces_fig_small)

# Legend sizing CEX
par(new=T)
```
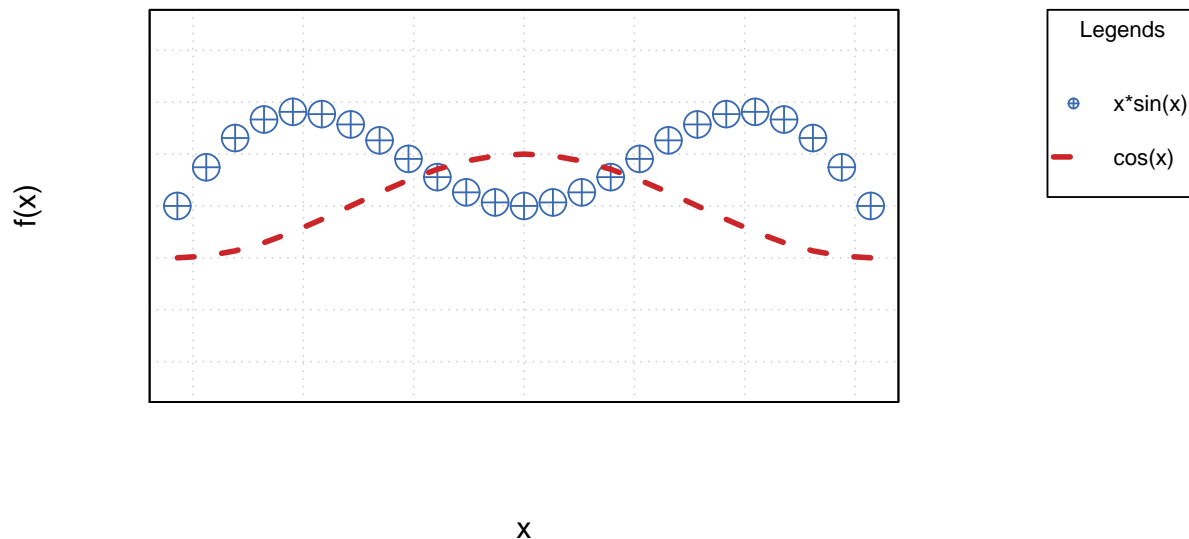
```
legend("topright",
       inset=c(-0.4,0),
       xpd=TRUE,
       c(st_point_1_y_legend, st_line_2_y_legend),
       col = c(st_point_1_blue, st_line_2_red),
       pch = c(st_point_1_pch, NA),
       cex = fl_ces_fig_small,
       lty = c(NA, st_line_2_lty),
       lwd = c(NA, st_line_2_lwd),
       title = 'Legends',
       y.intersp=2)
```

Scatter, Line and Curve Joint Ploting Example Using Base R
plot() + curve(): x*sin(x), cos(x), sin(x)*cos(x), sin(x)+tan(x)+cos(x)