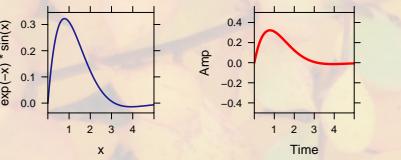


Graphics Commands

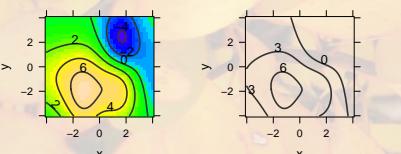
```
require(mosaic)  
  
plotFun(exp(-x)*sin(x)^x, x.lim=c(0,5))
```



Additional arguments:

Line color `col='red'`,
Line width `lwd=3`
Axis Labels `xlab='Time', ylab='Amp'`,
Vert. axis limits `ylim=c(-.5,.5)`
Add to existing plot `add=TRUE`

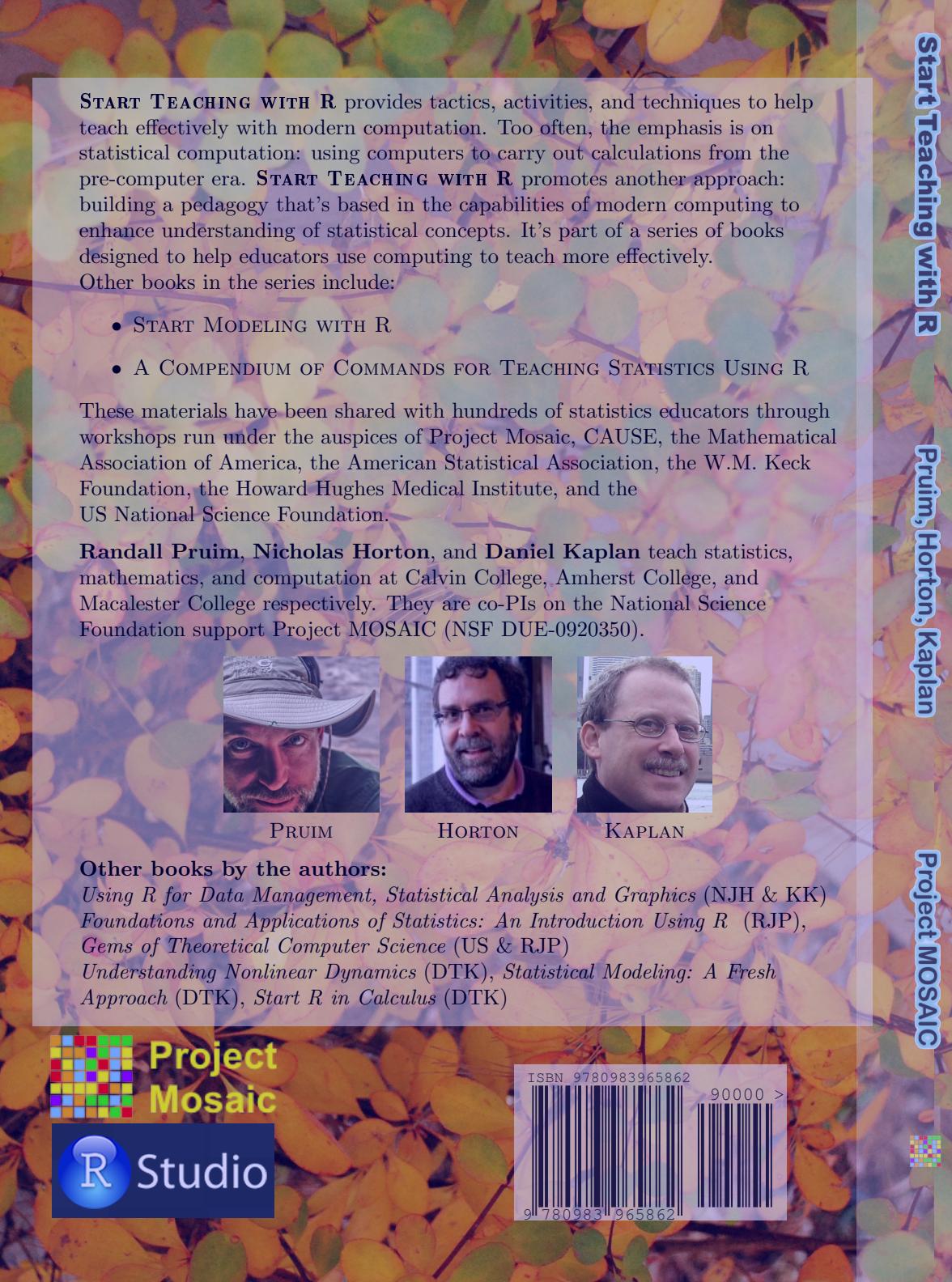
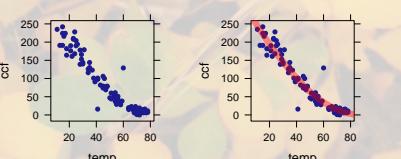
```
f = rfun(~ x & y, seed=1930)  
plotFun(f(x=x, y=y) ~ x & y,  
        x.lim=c(-4,4), y.lim=c(-4,4))
```



Additional arguments:

Just contours `filled=FALSE`
Contour levels `levels=c(0,3,6)`
Translucent alpha=0.2
Surface plot `surface=TRUE`

```
utils = fetchData("utilities.csv")  
plotPoints(ccf ~ temp, data=utils)  
mod = smoother(ccf~temp,data=utils,span=2)  
plotFun(mod(temp) ~ temp,add=TRUE,lwd=3)
```



START TEACHING WITH R provides tactics, activities, and techniques to help teach effectively with modern computation. Too often, the emphasis is on statistical computation: using computers to carry out calculations from the pre-computer era. **START TEACHING WITH R** promotes another approach: building a pedagogy that's based in the capabilities of modern computing to enhance understanding of statistical concepts. It's part of a series of books designed to help educators use computing to teach more effectively. Other books in the series include:

- START MODELING WITH R
- A COMPENDIUM OF COMMANDS FOR TEACHING STATISTICS USING R

These materials have been shared with hundreds of statistics educators through workshops run under the auspices of Project Mosaic, CAUSE, the Mathematical Association of America, the American Statistical Association, the W.M. Keck Foundation, the Howard Hughes Medical Institute, and the US National Science Foundation.

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PRUIM



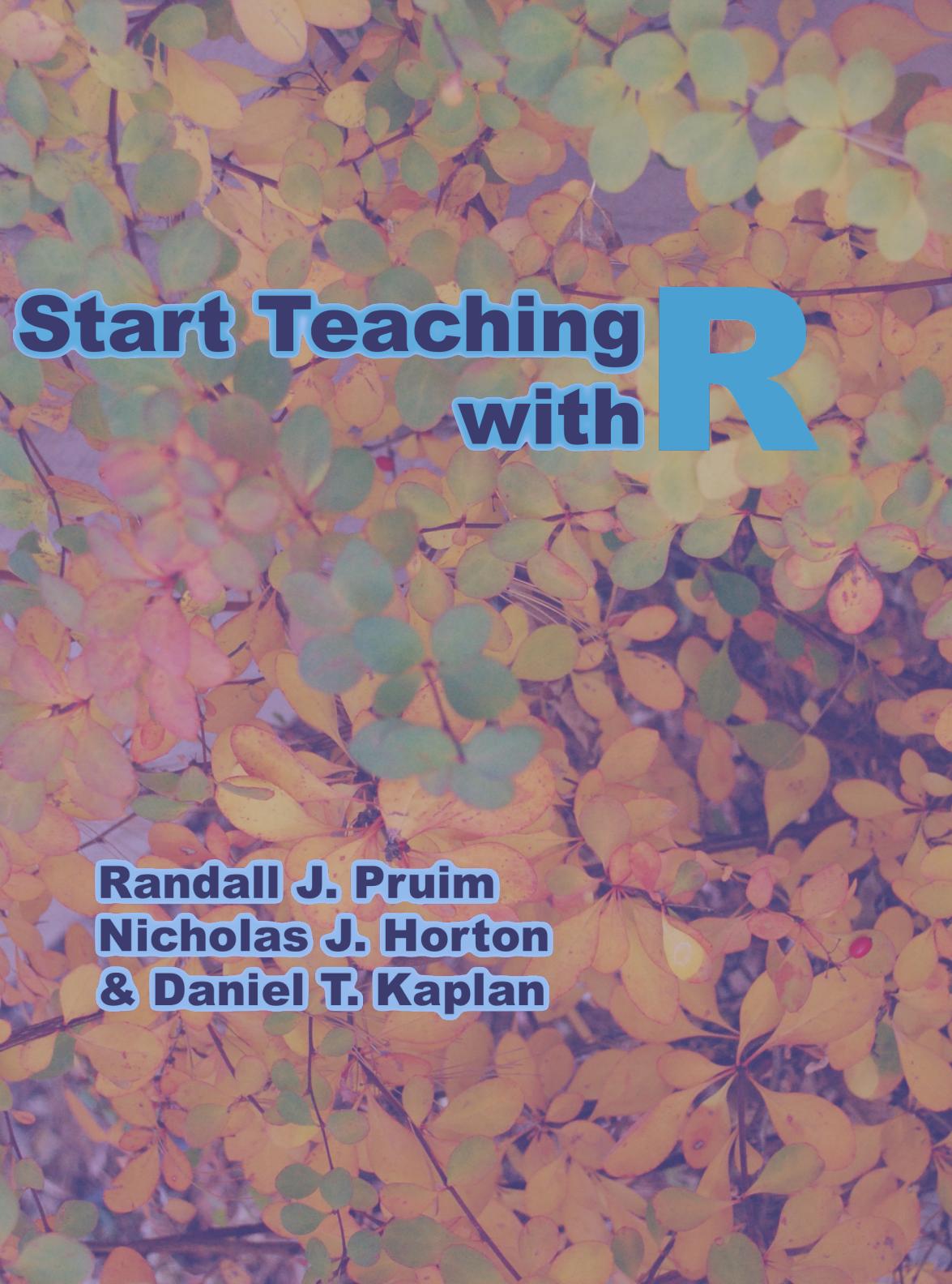
HORTON



KAPLAN

Other books by the authors:

Using R for Data Management, Statistical Analysis and Graphics (NJH & KK)
Foundations and Applications of Statistics: An Introduction Using R (RJP),
Gems of Theoretical Computer Science (US & RJP)
Understanding Nonlinear Dynamics (DTK), *Statistical Modeling: A Fresh Approach* (DTK), *Start R in Calculus* (DTK)



R/mosaic Calculus Commands

Preliminaries

Load the `mosaic` package.

```
require(mosaic)
```

Define a math function

```
f = makeFun(a * x^2 ~ x)  
g = makeFun(sin(y * x) ~ x & y)
```

Generate random function

```
h = rfun(~ x&y, seed=6732)
```

Read data file

```
utils = fetchData("utilities.csv")
```

Fit a model

```
m=fitModel(ccf ~ A+B+temp, data=utils)  
coef(m)
```

Smoothers & splines

```
s1 = smoother(ccf ~ temp, data=utils)  
s2 = spliner(ccf ~ temp, data=utils)
```

Differentiation

```
df = D(f(x) ~ x)  
dgxy = D(g(x=x,y=y) ~ x & y)
```

Anti-differentiation / Integration

```
F = antid(f(x,a=2) ~ x)  
F(3)-F(1)
```

Solve equations / find zeros.

```
findZeros(sin(x^2) - 0.5 ~ x,  
          x.lim=c(0,5))
```

Solve Differential Equations

```
s = integrateODE(dx ~ r*x*(K - x),  
                 x=1.3,  
                 r=.1, K=3, tdur=10)  
s$x(3) # eval x at time 3
```

Linear algebra

```
b = c(5,2,1)  
v1 = c(3,7,2)  
v2 = c(2,0,1)  
project(b ~ v1 + v2)
```