Help

- `apropos()`
- `?`
- `??` `example()`

Basic Calculations

Basic calculation works like a calculator.

```
# basic ops: + - * / ^ ( )
log(); exp(); sqrt()
log10(); abs(); choose()
```

Formula Interface

The following syntax (often with some parts omitted) is used for graphical summaries, numerical summaries, and inference procedures.

```
goal(y ~ x | z, data=..., groups=...)
```

For plots:
- `y`: is y-axis variable
- `x`: is x-axis variable
- `z`: conditioning variable (separate panels)
- `groups`: conditioning variable (overlaid graphs)

For other things:

```
'y ~ x | z' can usually be read 'y is modeled by (or depends on) x differently for each z'.
```

See the sampler for examples.

Numerical Summaries

These functions have a formula interface to match plotting.

```
favstats()  # mosaic
tally()    # mosaic
mean()     # mosaic augmented
median()   # mosaic augmented
sd()       # mosaic augmented
var()      # mosaic augmented
diffmean() # mosaic
quantile() # mosaic augmented
prop()     # mosaic
perc()     # mosaic
rank()     # mosaic
IQR()      # mosaic augmented
min(); max() # mosaic augmented
```

Graphics (mostly lattice)

```
bwplot()
xyplot()
histogram()  # mosaic augmented
densityplot()
freqpolygon() # mosaic
qqmath()
makeFun()    # mosaic
plotFun()    # mosaic
ladd()       # mosaic
dotPlot()    # mosaic
bargraph()   # mosaic
xqmath()     # mosaic
```

Inference

```
t.test()     # mosaic augmented
binom.test() # mosaic augmented
prop.test()  # mosaic augmented
xchisq.test()# mosaic augmented
fisher.test()# mosaic augmented
pval()       # mosaic
model <- lm() # linear models
summary(model)
coef(model)
confint(model) # mosaic augmented
anova(model)
makeFun(model) # mosaic
resid(model); fitted(model)
plot(model)   # mosaic
```

```
model <- glm() # logistic reg.
```

Randomization/Simulation

```
rflip()  # mosaic
do()     # mosaic
sample() # mosaic augmented
resample()# with replacement
shuffle() # mosaic
rbinom() # etc, if needed
```

Distributions

```
pbinom(); pnorm();
xpnorm()  # mosaic augmented
pchisq(); pt();
qbinom(); qnorm();
qchisq(); qt();
plotDist() # mosaic
```

Data

```
read.file()  # mosaic
nrow(); ncol(); dim()
summary()
str()
names()
head(); tail()
with()
```

```
rep(); seq(); sort(); rank()
```

Data Transformation

```
ntiles()    # mosaic
cut()
c();
cbind(); rbind()
colnames();
rownames();
relevel();
reorder();
```

```
select()  # dplyr
mutate()  # dplyr
filter()  # dplyr
arrange() # dplyr
summarise() # dplyr
group_by() # dplyr
left_join() # dplyr
inner_join() # dplyr
merge();
```
Flipping 6 coins [ Prob(Heads) = 0.5 ] ...
T H T H T
Number of Heads: 3 [Proportion Heads: 0.5]
do(2) * rflip(6)
  n heads tails  prop
  1 6 4 2 0.6667
  2 6 3 3 0.5000
coins <- do(1000) * rflip(6)
tally(~heads, data = coins)
  0 1 2 3 4 5 6
  10 85 241 311 250 82 21
tally(~heads, data = coins, format = "perc")
  0 1 2 3 4 5 6
  1.0 8.5 24.1 31.1 25.0 8.2 2.1
tally(~(heads >= 5 | heads <= 1), data = coins)
  TRUE FALSE
  198 802
histogram(~heads, data = coins, width = 1, groups = ~(heads >= 5 | heads <= 1))
tally(~sex + substance, data = HELPrct)
  substance
  sex alcohol cocaine heroin
  female 36 41 30
  male 141 111 94
mean(age ~ sex, data = HELPrct)
  female male
  36.25 35.47
diffmean(age ~ sex, data = HELPrct)
diffmean
  -0.7841
favstats(age ~ sex, data = HELPrct)
  .group min Q1 median Q3 max mean
  1 female 21 31 35 40.5 58 36.25
  2 male 19 30 35 40.0 60 35.47
  sd n missing
  1 7.585 107 0
  2 7.750 346 0
densityplot(~age | sex, groups = substance, data = HELPrct, auto.key = TRUE)

pval(binom.test(~sex, data = HELPrct))
  p.value
  1.932e-30
confint(t.test(~age, data = HELPrct))
  mean of x lower upper level
  35.65 34.94 36.37 0.95
model <- lm(wealth ~ height + gender, data=Heightweight)
w <- makeFun(model)
w( height=72, gender="male")
  1 179.1
xyplot(wealth ~ height, groups=gender, data=Heightweight)
plotFun(wt(h,gender="male") ~ h, add=TRUE, col="skyblue")
plotFun(wt(h,gender="female") ~ h, add=TRUE, col="navy")

plotDist("chisq", df = 4)