Hello

Load Packages

```
require(mosaic)
require(mosaicData)
```

Essential R Syntax

Function & arguments: `rflip(10)`

Optional arguments: `rflip(10, prob=0.3)`

Assignment: `x <- rflip(10, prob=0.3)`

Formula Interface

Used for graphics, statistics, inference, and modeling operations.

goal (y ~ x , data = mydata)

Read as: Calculate goal for how y "depends on" by x, or "is modeled by" x using variables in mydata

Examples:

```
favstats(homeless~sex, data=HELPrct)
|   .group min Q1 median   Q3 max     mean ...
| 1 female  21 31     35 40.5  58 36.25234 ...
| 2   male  19 30     35 40.0  60 35.46821 ...
```

```
quantile(age~sex,data=HELPrct,p=c(.2,.8))
|    .group 20%  80%
|  1 female  30 42.8
|  2   male  29 41.0
```

Only one variable? It goes to right of ~

```
mean( ~ age, data=HELPrct)

|  [1] 35.65342
```

Data Frames

Number of rows: `nrow(CPS85)`

Names of variables. `names(CPS85)`

Add a new variable to a data frame

```
res <- mutate(CPS85, yearly=wage*2000)
```

Drop a variable from a data frame

```
res <- select(CPS85, -married)
```

Extract cases meeting a criterion

```
res <- filter(CPS85, sector=="manag")
```

Random sample of 50 cases

```
mysamp <- sample(CPS85, size=50)
```

File reading and writing

```
myData <- read.file( "URL or filename" )
write.csv(myData, "filename.csv" )
```

Graphics interactively (in RStudio)

```
mplot(CPS85, format="scatter")
```

Other formats: `"boxplot"` `"violin"` `"frequency"` `"density"` `"frequency polygon"`

Statistical Graphics

Distribution of 1 Variable:

```
histogram( ~ wage, data=CPS85)
densityplot( ~ wage, data=CPS85)
freqpolygon( ~ wage, data=CPS85)
```

Scatter plot:`xyplot(wage ~ educ, data=CPS85)`

Compare distribution by group:

```
bwplot(wage ~ sex, data=CPS85)
```

Can use `groups=sex` as an argument to `xyplot()`, `densityplot()`, or `freqpolygon()`

RMarkdown documents

```
---
title: "Homework #3"
author: "Abby Seedief"
date: "January 7, 2015"
output: pdf_document
---

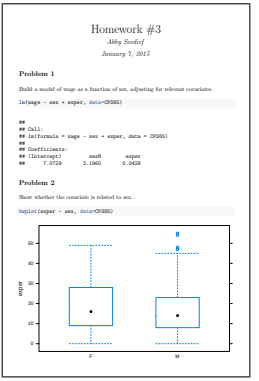
```{r include=FALSE}
require(mosaic)
require(mosaicData)
```

Problem 1

Build a model of wage as a function of sex,
adjusting for relevant covariates.
```{r}
lm(wage ~ sex + exper, data=CPS85)
```

Problem 2

Show whether the covariate is related to sex.
```{r}
bwplot(exper ~ sex, data=CPS85)
```
```


Homework #3

Abby Seedief

January 7, 2015

Problem 1

Build a model of wage as a function of sex, adjusting for relevant covariates.

```
lm(wage ~ sex + exper, data=CPS85)

##
## Call:
## lm(formula = wage ~ sex + exper, data = CPS85)
##
## Coefficients:
## (Intercept)         sexM        exper
##      7.3729       2.1960       0.0428
```

Problem 2

Show whether the covariate is related to sex.

```
bwplot(exper ~ sex, data=CPS85)
```


Compile to any of HTML, PDF, or Word.

See `mosaic plain` template through RStudio menu: File/New File/RMarkdown/From Template

Basic Statistical Tests

Difference between two means

```
res <- t.test(wage ~ sex, data=CPS85, mu=1.50)
```

Difference between two proportions

```
res <- prop.test(sex ~ union, data=CPS85)
```

For terse output use `pval(res)` or `confint(res)`.

Linear models

```
res <- lm(wage ~ sex + educ, data=CPS85)
```

For `lm( )` use `summary(res)`, `anova(res)`, `pval(res)` or `confint(res)`.

Randomization and Iteration

Resample/Bootstrap:

```
do(100)*mean(wage ~ sex, data=resample(CPS85))
```

Random Permutations:

```
do(100)*mean(wage ~ shuffle(sex), data=CPS85)
```

1000 trials of flipping 6 coins, count heads

```
flips <- do(1000) * rflip(6)
tally( ~ heads, data=flips)
```

10000 trials of adding three dice

```
scores <- do(10000)*sum(resample(1:6,size=3))
freqpolygon(~ result, data=scores)
```

Confidence Intervals & Statistical Tests

```
t.test(wage ~ sex, data=CPS85)
prop.test(43, 100)
crosstab <- tally(~union+sex, data=CPS85)
chisq.test( crosstab )  fisher.test(crosstab)
mod <- lm(wage ~ sector, data=CPS85)
```

Then ... `anova(mod)` `TukeyHSD(mod)` etc.

Modeling & Covariates

```
mod <- lm(wage ~ sex + educ, data=CPS85)
```

`summary(mod)` or `anova(mod)` or `confint(mod)`

Extract model function:

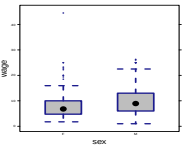
```
fun <- makeFun(mod)
fun(sex="F",educ=10)
plotFun(fun(sex="F",educ=x)} ~ x,x.lim=range(0,8))
```

Graphics Formula Syntax

goal (y ~ x | z ,

groups= w , data = mydata)

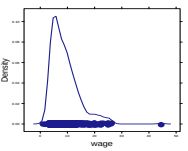
- y — y-axis variable (optional)
- x — x-axis variable (Required)
- z — facet-by variable (optional)
- w — color-by variable (optional)



Left: `bwplot(wage~sex, data= CPS85)`

Middle: `xyplot(wage~educ | sex, data= CPS85)`

Right: `xyplot(wage~educ, groups=sex, data=CPS85)`



Left: `densityplot(~wage, data= CPS85)`

Middle: `densityplot(~wage | sex, data= CPS85)`

Right: `densityplot(~wage,groups=sex, data=CPS85)`
