

quiz5

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R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed      dist
##  Min.   : 4.0    Min.   :  2.00
## 1st Qu.:12.0    1st Qu.: 26.00
##  Median :15.0    Median : 36.00
##  Mean   :15.4    Mean   : 42.98
## 3rd Qu.:19.0    3rd Qu.: 56.00
##  Max.   :25.0    Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

```

# Setting seed for reproducibility
set.seed(42)

# Number of days
days <- 100

# Simulate reading pages for each undergraduate, assuming independence
matt <- rnorm(days, mean=30, sd=10)
ash <- rnorm(days, mean=50, sd=15)
jacki <- rnorm(days, mean=20, sd=5)
rol <- rnorm(days, mean=45, sd=10)
mike <- rnorm(days, mean=40, sd=20)

# Ensuring no negative page counts
matt <- ifelse(matt < 0, 0, matt)
ash <- ifelse(ash < 0, 0, ash)
jacki <- ifelse(jacki < 0, 0, jacki)
rol <- ifelse(rol < 0, 0, rol)
mike <- ifelse(mike < 0, 0, mike)

# Creating a data frame
data <- data.frame(Day=1:days, Matt=matt, Ash=ash, Jacki=jacki, Rol=rol, Mike=mike)

# Performing five tests based on the simulated data

# 1. Test for normality for Matt's reading pattern
shapiro.test(data$Matt)

##
## Shapiro-Wilk normality test
##
## data: data$Matt
## W = 0.98122, p-value = 0.1654

# 2. Test for normality for Ash's reading pattern
shapiro.test(data$Ash)

##
## Shapiro-Wilk normality test
##
## data: data$Ash
## W = 0.98732, p-value = 0.4595

# 3. Correlation test between Matt and Ash (expecting low correlation due to independence)
cor.test(data$Matt, data$Ash)

##
## Pearson's product-moment correlation
##
## data: data$Matt and data$Ash
## t = 0.30981, df = 98, p-value = 0.7574
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1661592 0.2263075
## sample estimates:

```

```
##          cor
## 0.03127984

# 4. Variance analysis - ANOVA to compare means across all undergraduates
anova(lm(cbind(Matt, Ash, Jacki, Rol, Mike) ~ Day, data=data))

## Analysis of Variance Table
##
##              Df  Pillai approx F num Df den Df Pr(>F)
## (Intercept)  1 0.98518  1249.39      5    94 <2e-16 ***
## Day          1 0.02739    0.53      5    94 0.7535
## Residuals    98
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

# 5. Pairwise comparison of mean pages read per day between all undergraduates using Tukey's HSD test

install.packages("reshape2")

## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)

library(reshape2)
data_long <- melt(data, id.vars = "Day", variable.name = "Undergraduate", value.name = "Pages")

# ANOVA to compare means across all undergraduates
model <- aov(Pages ~ Undergraduate, data=data_long)
summary(model)

##              Df Sum Sq Mean Sq F value Pr(>F)
## Undergraduate  4  54029   13507   84.74 <2e-16 ***
## Residuals     495  78899     159
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

# Tukey's HSD test for pairwise comparison between all undergraduates
TukeyHSD(model)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = Pages ~ Undergraduate, data = data_long)
##
## $Undergraduate
##              diff              lwr              upr              p adj
## Ash-Matt      18.362596  13.474281  23.250911 0.0000000
## Jacki-Matt   -10.376989 -15.265304  -5.488674 0.0000001
## Rol-Matt      15.004216  10.115901  19.892532 0.0000000
## Mike-Matt      7.490227   2.601912  12.378542 0.0003112
## Jacki-Ash    -28.739585 -33.627900 -23.851270 0.0000000
## Rol-Ash       -3.358380  -8.246695   1.529935 0.3289468
## Mike-Ash     -10.872369 -15.760684  -5.984054 0.0000000
## Rol-Jacki     25.381206  20.492890  30.269521 0.0000000
## Mike-Jacki    17.867216  12.978901  22.755531 0.0000000
## Mike-Rol      -7.513990 -12.402305  -2.625674 0.0002942
```