2 Calculation Exercises (1,2,3,4)

Andrew Marshall

6/7/2018

# General instructions.

Exercise 1 is required and must be solved using both R and SAS. This exercise is worht 20 points, 10 points each for R and SAS. The R portion is included in this document and includes a unit test that checks the results of your calculations.

Exercises 2 is also required, but you may choose to use either R or SAS. Make that you include in your code comments documenting your choice, don’t simply submit the results without explanation. This exercise is worth 10 points.

Exercises 3-5 are optional, choose two of three and document your choice. Your are also allowed to choose from either R or SAS. Choose only 1, each will be worth 10 points, and the entire assignment will be worth 50 points.

Be sure to document your code and comment on the results.

# Exercise 1 (R and SAS, required)

Calculate Cohen’s for calories per recipe, calories per serving and servings per recipe, comparing years 1936 and 2006. Use the formula

## Part a.

Enter the R code in the code chunk below, and assign a value to d\_12 for unit testing.

# Variables for "calories per recipe" (CPR) to be input into formula  
 m\_1 <- 2123.8 #Mean CPR 1936  
 m\_2 <- 3051.9 #Mean CPR 2006  
 s\_1 <- 1050.0 #SD CPR 1936  
 s\_2 <- 1496.2 #SD CPR 2006  
  
# Assigning formula to variable d\_12 (CPR).  
d\_12CPR <- (abs(m\_1-m\_2))/(sqrt((s\_1^2 + s\_2^2)/2))  
#print(d\_12CPR) test output   
  
# Variables for "calories per serving" (CPS) to be input into formula  
m\_1 <- 268.1 #Mean CPS 1936  
m\_2 <- 285.6 #Mean CPs 2006  
s\_1 <- 124.8 #SD CPS 1936  
s\_2 <- 118.3 #SD CPS 2006  
  
# Assigning formula to variable d\_12 (CPS).  
d\_12CPS <- (abs(m\_1-m\_2))/(sqrt((s\_1^2 + s\_2^2)/2))  
#print(d\_12CPS) test output  
  
# Variables for "servings per recipe" (SPR) to be input into formula  
m\_1 <- 12.9 #Mean SPR 1936  
m\_2 <- 12.4 #Mean SPR 2006  
s\_1 <- 13.3 #SD SPR 1936  
s\_2 <- 14.3 #SD SPR 2006  
  
# Assigning formula to variable d\_12 (SPR).  
d\_12SPR <- (abs(m\_1-m\_2))/(sqrt((s\_1^2 + s\_2^2)/2))  
#print(d\_12SPR) test output

## [1] 8

## d is not assigned the correct value

## d is not assigned the correct value

## Part b.

For the SAS portion, you may use PROC IML or macro language. Use 2 Calculations Template.sas to start. This file contains unit tests for Exercises 1 and 2.

# Exercise 2 (R or SAS, required)

The probablity of an observation , when taken from a normal population with mean and variance is calculated by

For values of , write code to calculate . Assign the values to l\_1 and l\_2.

### Answer

If you choose to do this exercise in R, use the unit test below.

# Assigning variables values for use with formula calcuations  
x1 <- 0.1  
x2 <- 0.2  
mu <- 0  
sigma <- 1  
  
# Converted formula shown in R notation  
# (1/(sigma \* sqrt(2 \* pi))) \* (exp(-((x-mu)^2)/(2\*sigma ^ 2)))  
  
# formula using x = 0.1 (x1 as substitute for x)  
l\_1 <- (1/(sigma \* sqrt(2 \* pi))) \* (exp(-((x1-mu)^2)/(2\*sigma ^ 2)))  
print(l\_1)

## [1] 0.396952547477

# formula using x = 0.2 (x2 as substitute for x)  
l\_2 <- (1/(sigma \* sqrt(2 \* pi))) \* (exp(-((x2-mu)^2)/(2\*sigma ^ 2)))  
print(l\_2)

## [1] 0.391042693975

### Unit Test (R)

## [1] 12

## [1] 16

If you choose to do this exercise in SAS, you must do this in PROC IML, using the unit test template 2 Calculations.sas.

# Exercise 3 (R or SAS)

## Part a

Write code to compute

Type this in verbatim, using only numbers, -,\* and /, with no parenthesis. Do you agree with the result? Explain why, one or two sentences.

#### Answer

7-1\*0+3/3

## [1] 8

# Yes, I agree. The order of operations results in 7-(1\*0)+(3/3) --> 7-0+1 --> 8.

## Part b

According to “Why Did 74% of Facebook Users Get This Wrong?” (<http://www.classroomprofessor.com/teaching-math/why-did-74pc-of-facebook-users-get-this-wrong/>), most people would compute the result as 1. Use parenthesis ( ) to produce this result.

#### Answer

#Using parentheses to get the result 1 instead of the correct result 8.  
  
((7-1)\*0)+3/3

## [1] 1

## Part c

Several respondents to the survey cited in Part 2 gave the answer 6. Add *one* set of parenthesis to produce this result.

#### Answer

#Using one set of parenthesis to produce the result 6.  
7-(1\*0+3)/3

## [1] 6

# Exercise 4. (R or SAS)

### Part a

Quoting from Wansink and Payne

Because of changes in ingredients, the mean average calories in a recipe increased by 928.1 (from 2123.8 calories … to 3051.9 calories … ), representing a 43.7% increase.

Show how 43.7% is calculated from 2123.8 and 3051.9, and confirm W&P result.

#Determining the difference between provided values (2123.8,3051.9), then dividing that differance by first value (261.1) provides the percentage increase in calories per recipe once the result is rounded the nearest tenth.  
((3051.9 - 2123.8)/2123.8) \* 100

## [1] 43.6999717488

The resulting increase of 168.8 calories (from 268.1 calories … to 436.9 calories …) represents a 63.0% increase … in calories per serving.

### Part b

Repeat the calculations from above and confirm the reported 63.0% increase in calories per serving.

#Determining the difference between provided values (268.1,436.9), then dividing that differance by first value (268.1) provides the percentage increase in calories per serving once the result is rounded the nearest tenth.  
((436.9-268.1)/268.1) \* 100

## [1] 62.9615814994

### Part c

Using values from Table 1 Wansink, calculate the percent change in calories per serving from 1997 to 2006. How does this value compare to 63.0 increase as quoted in part b.?

#Determining the difference between provided values (p\_1936,p\_1997), then dividing that differance by first value (p\_1997) provides the percentage increase in calories per serving.  
  
p\_19362006 <- ((436.9-268.1)/268.1) \* 100 #1936 & 2006  
#print(p\_19362006) # test output for p\_1936  
p\_19972006 <- ((384.4-288.6)/288.6) \* 100 #1997 & 2006  
#print(p\_19972006) # test output for p\_1997  
p\_1936 <- 268.1  
p\_1997 <- 288.6  
  
((p\_1997-p\_1936)/p\_1936)\*100

## [1] 7.64640059679

#The percent change between 1997 and 2006 was 33.2%, while the percent change between 1936 and 2006 was 63.0%.  
#It is also worth noting that the percent change between 1936 and 1997 is only 7.6%

# Exercise 5. (R or SAS)

From Wansink and Payne > Given that the average 2006 recipe had 1.1 fewer servings than in 1936, the average calorie density per serving size has increased by 37.4%

From <https://foodpsychology.cornell.edu/research/joy-cooking-too-much-70-years-calorie-increases-classic-recipes> > “Also, the mean average calories per serving increased in 17 out of the 18 recipes by 37.4% from 268.1 calories to 436.9 calories”

<https://foodpsychology.cornell.edu/discoveries/joy-cooking-too-much> >This expanded portion size helps explain why calories per serving have increased from an average of 168.8 calories to 436.9 calories, which is a 63% increase in calories per serving

Show calculations in R or SAS to either confirm these statements (using values from Wansink Table 1) or show where the quoted values are inconsistent with Wansink Table 1.

# Total points from unit tests

unit.test.points

## [1] 16