Module-7.R

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#1. Download any type of data (from the web or use datasets package) or create your own set.   
head(mtcars, 6)

## mpg cyl disp hp drat wt qsec vs am gear carb  
## Mazda RX4 21.0 6 160 110 3.90 2.620 16.46 0 1 4 4  
## Mazda RX4 Wag 21.0 6 160 110 3.90 2.875 17.02 0 1 4 4  
## Datsun 710 22.8 4 108 93 3.85 2.320 18.61 1 1 4 1  
## Hornet 4 Drive 21.4 6 258 110 3.08 3.215 19.44 1 0 3 1  
## Hornet Sportabout 18.7 8 360 175 3.15 3.440 17.02 0 0 3 2  
## Valiant 18.1 6 225 105 2.76 3.460 20.22 1 0 3 1

#2. 2. Your second step, determine if generic function as discussed in this module can be assigned to your data set, and if not, why?   
summary(mtcars)

## mpg cyl disp hp   
## Min. :10.40 Min. :4.000 Min. : 71.1 Min. : 52.0   
## 1st Qu.:15.43 1st Qu.:4.000 1st Qu.:120.8 1st Qu.: 96.5   
## Median :19.20 Median :6.000 Median :196.3 Median :123.0   
## Mean :20.09 Mean :6.188 Mean :230.7 Mean :146.7   
## 3rd Qu.:22.80 3rd Qu.:8.000 3rd Qu.:326.0 3rd Qu.:180.0   
## Max. :33.90 Max. :8.000 Max. :472.0 Max. :335.0   
## drat wt qsec vs   
## Min. :2.760 Min. :1.513 Min. :14.50 Min. :0.0000   
## 1st Qu.:3.080 1st Qu.:2.581 1st Qu.:16.89 1st Qu.:0.0000   
## Median :3.695 Median :3.325 Median :17.71 Median :0.0000   
## Mean :3.597 Mean :3.217 Mean :17.85 Mean :0.4375   
## 3rd Qu.:3.920 3rd Qu.:3.610 3rd Qu.:18.90 3rd Qu.:1.0000   
## Max. :4.930 Max. :5.424 Max. :22.90 Max. :1.0000   
## am gear carb   
## Min. :0.0000 Min. :3.000 Min. :1.000   
## 1st Qu.:0.0000 1st Qu.:3.000 1st Qu.:2.000   
## Median :0.0000 Median :4.000 Median :2.000   
## Mean :0.4062 Mean :3.688 Mean :2.812   
## 3rd Qu.:1.0000 3rd Qu.:4.000 3rd Qu.:4.000   
## Max. :1.0000 Max. :5.000 Max. :8.000

# The dataset is indeed compatabile with a generic function, since it is dispatching the summary method over the values  
  
#3. In the last step, explore if S3 and S4 can be assigned to your data set or the database "mtcars."  
  
#Check if S3  
camaro <- c(mpg = 15.0, cyl=5, disp = 160, hp =200, wt = 2.620, qsec = 16.46, vs = 8, am = 1, gear = 4, carb = 4)  
mtcars = rbind(mtcars,camaro)

## Warning in rbind(deparse.level, ...): number of columns of result, 11, is not a  
## multiple of vector length 10 of arg 2

str(mtcars)

## 'data.frame': 33 obs. of 11 variables:  
## $ mpg : num 21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...  
## $ cyl : num 6 6 4 6 8 6 8 4 4 6 ...  
## $ disp: num 160 160 108 258 360 ...  
## $ hp : num 110 110 93 110 175 105 245 62 95 123 ...  
## $ drat: num 3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...  
## $ wt : num 2.62 2.88 2.32 3.21 3.44 ...  
## $ qsec: num 16.5 17 18.6 19.4 17 ...  
## $ vs : num 0 0 1 1 0 1 0 1 1 1 ...  
## $ am : num 1 1 1 0 0 0 0 0 0 0 ...  
## $ gear: num 4 4 4 3 3 3 3 4 4 4 ...  
## $ carb: num 4 4 1 1 2 1 4 2 2 4 ...

#Check if S4  
isS4(mtcars$hp)

## [1] FALSE

#4. create two examples of S3 and S4. Post each step you took to create and test the two functions useMethod() and setGeneric()  
  
#Starting with S4 you need to first create a class using the set\_class function  
setClass("Student",   
 slots = c(  
 name = "character",   
 age = "numeric",  
 GPA = 'numeric'  
 )  
)  
  
#S4  
s4 <- new("Student",name="Myself", age=29, GPA=3.5)  
s4

## An object of class "Student"  
## Slot "name":  
## [1] "Myself"  
##   
## Slot "age":  
## [1] 29  
##   
## Slot "GPA":  
## [1] 3.5

#Set genric  
setGeneric("GPA", function(x) standardGeneric("GPA"))

## [1] "GPA"

#Use method  
setMethod("GPA", "Student", function(x) x@GPA)  
GPA(s4)

## [1] 3.5

#Test if s4  
isS4(s4)

## [1] TRUE

#Now for a S3  
s3 <- list(name = "Jason", age = 24, GPA = 3.0)  
  
s3

## $name  
## [1] "Jason"  
##   
## $age  
## [1] 24  
##   
## $GPA  
## [1] 3