**Homework Submission Sample**

R Code – unexecuted

#

# HW2 Jake Dineen

mtcars #Query for mtcars table/dataset

myCars <- mtcars #Assign table to Vector "myCars"

myCars #Call "myCars" vector

data.frame(myCars) #dataframe of myCars Dataset

str(myCars) #Structure of myCars Dataset

#Step1

indexHP <- which.max(myCars$hp) #Store Vector for index w maxhp

indexHP #call Vector for index # w maxhp =335

myCars[31,] #query for observation/index = 31. Results = 335hp from Maserati Bora

#or

myCars [indexHP,]

#or order by descending hp

highHPcars <- myCars[ order(-myCars$hp),] #-myCars$hp to sort in descending by hp

highHPcars #Call Vector highHPcars to render desc order by hp

#Step2

indexMPG <- which.max(myCars$mpg)#Store Vector for index w maxhp

indexMPG

myCars[20,]#query for observation/index = 20. Results = 33.9mpg from Toyota Corolla

#Or

myCars[indexMPG,]

#sorted data.frame, based on mpg

highMPGcars <-myCars [ order(-myCars$mpg),] #-myCars$mpg to sort desc by mpg

highMPGcars #Call Vector highMPGcars to render desc order by mpg

#Step3

myCars$hp/myCars$mpg #ratio of hp to mpg.

myCars$mpg/myCars$hp #ratio of mpg to hp

#add column to df "myCars" with hp to mpg ratio

myCars$hptompg <-(myCars$hp/myCars$mpg) #add new.co to myCars df with hp/mpg ratio

which.max(myCars$hptompg) #query for max hp to mpg index

myCars [31,] #call result of best hp to mpg ratio

#add column to df "myCars" with mpg to hp ratio

myCars$mpgtohp <- (myCars$mpg/myCars$hp) #add new.co to myCars df with mpg/hp ratio

which.max(myCars$mpg/myCars$hp) #query for max mpg to hp index

myCars [19,] #call result of best mpg to hp ratio

myCars [order(-myCars$hptompg),] #sort Desc by hptompg ratio

myCars [order(-myCars$mpgtohp),] #sort Desc by mpgtohp ratio

#Step4

#Scaling

myCars$scalempg <-scale (myCars$mpg, scale = T) #New Col for scale of mpg

myCars$scalehp <- scale (myCars$hp, scale = T) #New Col for scale of hp

myCars$scalempgtohp <- (scalempg/scalehp) #New Col for derived value of scale of mpg/scale of hp

myCars #call dataframe

myCars [order(-myCars$scalempgtohp),] #Sort Desc for derived value of scale of mpg/scale of hp

which.max(myCars$scalempgtohp) #max index for best scalempgtohp

myCars [11,] #show row for best scale of mpg to hp ratio

R Code – Executed

> #

> # HW2 Jake Dineen

>

> mtcars #Query for mtcars table/dataset

mpg cyl disp hp drat wt qsec vs am gear carb

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2

> myCars <- mtcars #Assign table to Vector "myCars"

> myCars #Call "myCars" vector

mpg cyl disp hp drat wt qsec vs am gear carb

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2

> data.frame(myCars) #dataframe of myCars Dataset

mpg cyl disp hp drat wt qsec vs am gear carb

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2

> str(myCars) #Structure of myCars Dataset

'data.frame': 32 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 ...

>

>

> #Step1

> indexHP <- which.max(myCars$hp) #Store Vector for index w maxhp

> indexHP #call Vector for index # w maxhp =335

[1] 31

> myCars[31,] #query for observation/index = 31. Results = 335hp from Maserati Bora

mpg cyl disp hp drat wt qsec vs am gear carb

Maserati Bora 15 8 301 335 3.54 3.57 14.6 0 1 5 8

> #or

> myCars [indexHP,]

mpg cyl disp hp drat wt qsec vs am gear carb

Maserati Bora 15 8 301 335 3.54 3.57 14.6 0 1 5 8

>

> #or order by descending hp

> highHPcars <- myCars[ order(-myCars$hp),] #-myCars$hp to sort in descending by hp

> highHPcars #Call Vector highHPcars to render desc order by hp

mpg cyl disp hp drat wt qsec vs am gear carb

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2

>

> #Step2

> indexMPG <- which.max(myCars$mpg)#Store Vector for index w maxhp

> indexMPG

[1] 20

> myCars[20,]#query for observation/index = 20. Results = 33.9mpg from Toyota Corolla

mpg cyl disp hp drat wt qsec vs am gear carb

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.9 1 1 4 1

> #Or

> myCars[indexMPG,]

mpg cyl disp hp drat wt qsec vs am gear carb

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.9 1 1 4 1

> #sorted data.frame, based on mpg

> highMPGcars <-myCars [ order(-myCars$mpg),] #-myCars$mpg to sort desc by mpg

> highMPGcars #Call Vector highMPGcars to render desc order by mpg

mpg cyl disp hp drat wt qsec vs am gear carb

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4

>

> #Step3

> myCars$hp/myCars$mpg #ratio of hp to mpg.

[1] 5.238095 5.238095 4.078947 5.140187 9.358289 5.801105 17.132867 2.540984 4.166667 6.406250 6.910112

[12] 10.975610 10.404624 11.842105 19.711538 20.673077 15.646259 2.037037 1.710526 1.917404 4.511628 9.677419

[23] 9.868421 18.421053 9.114583 2.417582 3.500000 3.717105 16.708861 8.883249 22.333333 5.093458

> myCars$mpg/myCars$hp #ratio of mpg to hp

[1] 0.19090909 0.19090909 0.24516129 0.19454545 0.10685714 0.17238095 0.05836735 0.39354839 0.24000000 0.15609756

[11] 0.14471545 0.09111111 0.09611111 0.08444444 0.05073171 0.04837209 0.06391304 0.49090909 0.58461538 0.52153846

[21] 0.22164948 0.10333333 0.10133333 0.05428571 0.10971429 0.41363636 0.28571429 0.26902655 0.05984848 0.11257143

[31] 0.04477612 0.19633028

>

> #add column to df "myCars" with hp to mpg ratio

> myCars$hptompg <-(myCars$hp/myCars$mpg) #add new.co to myCars df with hp/mpg ratio

> which.max(myCars$hptompg) #query for max hp to mpg index

[1] 31

> myCars [31,] #call result of best hp to mpg ratio

mpg cyl disp hp drat wt qsec vs am gear carb hptompg

Maserati Bora 15 8 301 335 3.54 3.57 14.6 0 1 5 8 22.33333

>

> #add column to df "myCars" with mpg to hp ratio

> myCars$mpgtohp <- (myCars$mpg/myCars$hp) #add new.co to myCars df with mpg/hp ratio

> which.max(myCars$mpg/myCars$hp) #query for max mpg to hp index

[1] 19

> myCars [19,] #call result of best mpg to hp ratio

mpg cyl disp hp drat wt qsec vs am gear carb hptompg mpgtohp

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2 1.710526 0.5846154

>

> myCars [order(-myCars$hptompg),] #sort Desc by hptompg ratio

mpg cyl disp hp drat wt qsec vs am gear carb hptompg mpgtohp

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8 22.333333 0.04477612

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4 20.673077 0.04837209

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4 19.711538 0.05073171

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4 18.421053 0.05428571

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4 17.132867 0.05836735

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4 16.708861 0.05984848

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4 15.646259 0.06391304

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3 11.842105 0.08444444

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3 10.975610 0.09111111

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3 10.404624 0.09611111

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2 9.868421 0.10133333

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2 9.677419 0.10333333

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2 9.358289 0.10685714

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2 9.114583 0.10971429

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6 8.883249 0.11257143

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4 6.910112 0.14471545

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4 6.406250 0.15609756

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1 5.801105 0.17238095

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4 5.238095 0.19090909

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4 5.238095 0.19090909

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1 5.140187 0.19454545

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2 5.093458 0.19633028

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1 4.511628 0.22164948

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2 4.166667 0.24000000

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1 4.078947 0.24516129

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2 3.717105 0.26902655

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2 3.500000 0.28571429

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2 2.540984 0.39354839

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1 2.417582 0.41363636

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1 2.037037 0.49090909

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1 1.917404 0.52153846

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2 1.710526 0.58461538

> myCars [order(-myCars$mpgtohp),] #sort Desc by mpgtohp ratio

mpg cyl disp hp drat wt qsec vs am gear carb hptompg mpgtohp

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2 1.710526 0.58461538

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1 1.917404 0.52153846

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1 2.037037 0.49090909

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1 2.417582 0.41363636

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2 2.540984 0.39354839

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2 3.500000 0.28571429

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2 3.717105 0.26902655

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1 4.078947 0.24516129

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2 4.166667 0.24000000

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1 4.511628 0.22164948

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2 5.093458 0.19633028

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1 5.140187 0.19454545

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4 5.238095 0.19090909

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4 5.238095 0.19090909

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1 5.801105 0.17238095

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4 6.406250 0.15609756

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4 6.910112 0.14471545

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6 8.883249 0.11257143

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2 9.114583 0.10971429

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2 9.358289 0.10685714

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2 9.677419 0.10333333

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2 9.868421 0.10133333

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3 10.404624 0.09611111

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3 10.975610 0.09111111

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3 11.842105 0.08444444

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4 15.646259 0.06391304

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4 16.708861 0.05984848

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4 17.132867 0.05836735

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4 18.421053 0.05428571

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4 19.711538 0.05073171

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4 20.673077 0.04837209

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8 22.333333 0.04477612

>

> #Step4

> #Scaling

> myCars$scalempg <-scale (myCars$mpg, scale = T) #New Col for scale of mpg

> myCars$scalehp <- scale (myCars$hp, scale = T) #New Col for scale of hp

> myCars$scalempgtohp <- (scalempg/scalehp) #New Col for derived value of scale of mpg/scale of hp

> myCars #call dataframe

mpg cyl disp hp drat wt qsec vs am gear carb hptompg mpgtohp scalempg scalehp

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4 5.238095 0.19090909 0.15088482 -0.53509284

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4 5.238095 0.19090909 0.15088482 -0.53509284

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1 4.078947 0.24516129 0.44954345 -0.78304046

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1 5.140187 0.19454545 0.21725341 -0.53509284

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2 9.358289 0.10685714 -0.23073453 0.41294217

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1 5.801105 0.17238095 -0.33028740 -0.60801861

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4 17.132867 0.05836735 -0.96078893 1.43390296

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2 2.540984 0.39354839 0.71501778 -1.23518023

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2 4.166667 0.24000000 0.44954345 -0.75387015

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4 6.406250 0.15609756 -0.14777380 -0.34548584

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4 6.910112 0.14471545 -0.38006384 -0.34548584

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3 10.975610 0.09111111 -0.61235388 0.48586794

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3 10.404624 0.09611111 -0.46302456 0.48586794

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3 11.842105 0.08444444 -0.81145962 0.48586794

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4 19.711538 0.05073171 -1.60788262 0.85049680

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4 20.673077 0.04837209 -1.60788262 0.99634834

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4 15.646259 0.06391304 -0.89442035 1.21512565

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1 2.037037 0.49090909 2.04238943 -1.17683962

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2 1.710526 0.58461538 1.71054652 -1.38103178

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1 1.917404 0.52153846 2.29127162 -1.19142477

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1 4.511628 0.22164948 0.23384555 -0.72469984

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2 9.677419 0.10333333 -0.76168319 0.04831332

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2 9.868421 0.10133333 -0.81145962 0.04831332

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4 18.421053 0.05428571 -1.12671039 1.43390296

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2 9.114583 0.10971429 -0.14777380 0.41294217

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1 2.417582 0.41363636 1.19619000 -1.17683962

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2 3.500000 0.28571429 0.98049211 -0.81221077

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2 3.717105 0.26902655 1.71054652 -0.49133738

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4 16.708861 0.05984848 -0.71190675 1.71102089

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6 8.883249 0.11257143 -0.06481307 0.41294217

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8 22.333333 0.04477612 -0.84464392 2.74656682

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2 5.093458 0.19633028 0.21725341 -0.54967799

scalempgtohp

Mazda RX4 -0.2819788

Mazda RX4 Wag -0.2819788

Datsun 710 -0.5740999

Hornet 4 Drive -0.4060107

Hornet Sportabout -0.5587575

Valiant 0.5432192

Duster 360 -0.6700516

Merc 240D -0.5788773

Merc 230 -0.5963142

Merc 280 0.4277275

Merc 280C 1.1000851

Merc 450SE -1.2603299

Merc 450SL -0.9529844

Merc 450SLC -1.6701238

Cadillac Fleetwood -1.8905217

Lincoln Continental -1.6137756

Chrysler Imperial -0.7360723

Fiat 128 -1.7354866

Honda Civic -1.2386004

Toyota Corolla -1.9231358

Toyota Corona -0.3226792

Dodge Challenger -15.7654896

AMC Javelin -16.7957734

Camaro Z28 -0.7857647

Pontiac Firebird -0.3578559

Fiat X1-9 -1.0164427

Porsche 914-2 -1.2071893

Lotus Europa -3.4814093

Ford Pantera L -0.4160713

Ferrari Dino -0.1569543

Maserati Bora -0.3075272

Volvo 142E -0.3952376

> myCars [order(-myCars$scalempgtohp),] #Sort Desc for derived value of scale of mpg/scale of hp

mpg cyl disp hp drat wt qsec vs am gear carb hptompg mpgtohp scalempg scalehp

Merc 280C 17.8 6 167.6 123 3.92 3.440 18.90 1 0 4 4 6.910112 0.14471545 -0.38006384 -0.34548584

Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1 5.801105 0.17238095 -0.33028740 -0.60801861

Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4 6.406250 0.15609756 -0.14777380 -0.34548584

Ferrari Dino 19.7 6 145.0 175 3.62 2.770 15.50 0 1 5 6 8.883249 0.11257143 -0.06481307 0.41294217

Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4 5.238095 0.19090909 0.15088482 -0.53509284

Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4 5.238095 0.19090909 0.15088482 -0.53509284

Maserati Bora 15.0 8 301.0 335 3.54 3.570 14.60 0 1 5 8 22.333333 0.04477612 -0.84464392 2.74656682

Toyota Corona 21.5 4 120.1 97 3.70 2.465 20.01 1 0 3 1 4.511628 0.22164948 0.23384555 -0.72469984

Pontiac Firebird 19.2 8 400.0 175 3.08 3.845 17.05 0 0 3 2 9.114583 0.10971429 -0.14777380 0.41294217

Volvo 142E 21.4 4 121.0 109 4.11 2.780 18.60 1 1 4 2 5.093458 0.19633028 0.21725341 -0.54967799

Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1 5.140187 0.19454545 0.21725341 -0.53509284

Ford Pantera L 15.8 8 351.0 264 4.22 3.170 14.50 0 1 5 4 16.708861 0.05984848 -0.71190675 1.71102089

Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2 9.358289 0.10685714 -0.23073453 0.41294217

Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1 4.078947 0.24516129 0.44954345 -0.78304046

Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2 2.540984 0.39354839 0.71501778 -1.23518023

Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2 4.166667 0.24000000 0.44954345 -0.75387015

Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4 17.132867 0.05836735 -0.96078893 1.43390296

Chrysler Imperial 14.7 8 440.0 230 3.23 5.345 17.42 0 0 3 4 15.646259 0.06391304 -0.89442035 1.21512565

Camaro Z28 13.3 8 350.0 245 3.73 3.840 15.41 0 0 3 4 18.421053 0.05428571 -1.12671039 1.43390296

Merc 450SL 17.3 8 275.8 180 3.07 3.730 17.60 0 0 3 3 10.404624 0.09611111 -0.46302456 0.48586794

Fiat X1-9 27.3 4 79.0 66 4.08 1.935 18.90 1 1 4 1 2.417582 0.41363636 1.19619000 -1.17683962

Porsche 914-2 26.0 4 120.3 91 4.43 2.140 16.70 0 1 5 2 3.500000 0.28571429 0.98049211 -0.81221077

Honda Civic 30.4 4 75.7 52 4.93 1.615 18.52 1 1 4 2 1.710526 0.58461538 1.71054652 -1.38103178

Merc 450SE 16.4 8 275.8 180 3.07 4.070 17.40 0 0 3 3 10.975610 0.09111111 -0.61235388 0.48586794

Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82 0 0 3 4 20.673077 0.04837209 -1.60788262 0.99634834

Merc 450SLC 15.2 8 275.8 180 3.07 3.780 18.00 0 0 3 3 11.842105 0.08444444 -0.81145962 0.48586794

Fiat 128 32.4 4 78.7 66 4.08 2.200 19.47 1 1 4 1 2.037037 0.49090909 2.04238943 -1.17683962

Cadillac Fleetwood 10.4 8 472.0 205 2.93 5.250 17.98 0 0 3 4 19.711538 0.05073171 -1.60788262 0.85049680

Toyota Corolla 33.9 4 71.1 65 4.22 1.835 19.90 1 1 4 1 1.917404 0.52153846 2.29127162 -1.19142477

Lotus Europa 30.4 4 95.1 113 3.77 1.513 16.90 1 1 5 2 3.717105 0.26902655 1.71054652 -0.49133738

Dodge Challenger 15.5 8 318.0 150 2.76 3.520 16.87 0 0 3 2 9.677419 0.10333333 -0.76168319 0.04831332

AMC Javelin 15.2 8 304.0 150 3.15 3.435 17.30 0 0 3 2 9.868421 0.10133333 -0.81145962 0.04831332

scalempgtohp

Merc 280C 1.1000851

Valiant 0.5432192

Merc 280 0.4277275

Ferrari Dino -0.1569543

Mazda RX4 -0.2819788

Mazda RX4 Wag -0.2819788

Maserati Bora -0.3075272

Toyota Corona -0.3226792

Pontiac Firebird -0.3578559

Volvo 142E -0.3952376

Hornet 4 Drive -0.4060107

Ford Pantera L -0.4160713

Hornet Sportabout -0.5587575

Datsun 710 -0.5740999

Merc 240D -0.5788773

Merc 230 -0.5963142

Duster 360 -0.6700516

Chrysler Imperial -0.7360723

Camaro Z28 -0.7857647

Merc 450SL -0.9529844

Fiat X1-9 -1.0164427

Porsche 914-2 -1.2071893

Honda Civic -1.2386004

Merc 450SE -1.2603299

Lincoln Continental -1.6137756

Merc 450SLC -1.6701238

Fiat 128 -1.7354866

Cadillac Fleetwood -1.8905217

Toyota Corolla -1.9231358

Lotus Europa -3.4814093

Dodge Challenger -15.7654896

AMC Javelin -16.7957734

> which.max(myCars$scalempgtohp) #max index for best scalempgtohp

[1] 11

> myCars [11,] #show row for best scale of mpg to hp ratio

mpg cyl disp hp drat wt qsec vs am gear carb hptompg mpgtohp scalempg scalehp scalempgtohp

Merc 280C 17.8 6 167.6 123 3.92 3.44 18.9 1 0 4 4 6.910112 0.1447154 -0.3800638 -0.3454858 1.100085