BA\_HW2.R

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########PROBLEM 1: Citibike########  
####read csv####  
url<-"https://raw.githubusercontent.com/jcbonilla/BusinessAnalytics/master/BAData/JC-201709-citibike-tripdata.csv "  
data<-read.csv(url, header=TRUE,stringsAsFactors=FALSE)  
#summary for tripduration  
summary(data$tripduration)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 61.0 238.0 355.0 756.9 610.0 2181628.0

var(data$tripduration)

## [1] 159480876

sd(data$tripduration)

## [1] 12628.57

#summary for age  
age<- 2020 - suppressWarnings(as.numeric(data$birth.year)) #get age  
summary(age)

## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's   
## 19.00 33.00 37.00 39.88 45.00 133.00 2384

var(age,na.rm = TRUE)

## [1] 100.9908

sd(age,na.rm = TRUE)

## [1] 10.04942

#summary statistics for tripduration in minutes  
tripdurationMinutes <- data$tripduratio/60  
summary(tripdurationMinutes)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1.02 3.97 5.92 12.62 10.17 36360.47

var(tripdurationMinutes)

## [1] 44300.24

sd(tripdurationMinutes)

## [1] 210.4762

#the correlation between age and tripduration  
cor(age,tripdurationMinutes,use = 'complete.obs')

## [1] 0.007055148

**Business problems:**

#####REVENUE#######  
revenue = sum((tripdurationMinutes>45)\*5,(tripdurationMinutes<=45)\*3)  
revenue

## [1] 100651

######VAR IN MINUTES TRIPDURATION#####  
var(tripdurationMinutes)

## [1] 44300.24

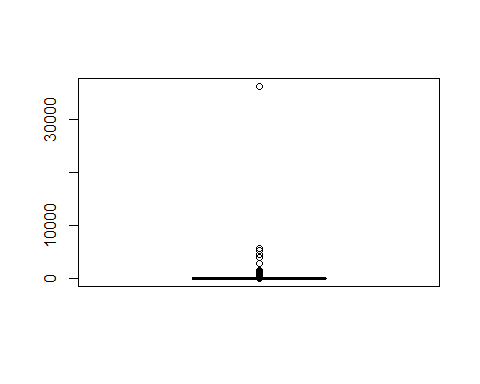
sd(tripdurationMinutes)

## [1] 210.4762

summary(tripdurationMinutes)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1.02 3.97 5.92 12.62 10.17 36360.47

boxplot(tripdurationMinutes)



#the var is very big since there are some very large outliers  
##########PRICE STRATEGY#######  
table(tripdurationMinutes<=45)

##   
## FALSE TRUE   
## 647 32472

percentage <- 32472/(32472+647)  
percentage

## [1] 0.9804644

###98% people ride the bike under 45mins, should lower the price for over 45mins riding to get more revenue.  
############INVENTORY STRATEGY##########  
#Here the majority will return the bikes in 45mins which means the company want to increase liquidity with limited inventory.  
  
#############PROBLEM 2:Zagat#############  
url1<-"https://raw.githubusercontent.com/jcbonilla/BusinessAnalytics/master/BAData/zagat.CSV"  
data1<-read.csv(url1, header=TRUE,stringsAsFactors=FALSE)  
summary(data1)#get summary for price,decor,service, and food

## Name Food Decor Service   
## Length:300 Min. : 9.00 Min. : 3.00 Min. : 8.0   
## Class :character 1st Qu.:16.00 1st Qu.:13.00 1st Qu.:14.0   
## Mode :character Median :19.00 Median :16.00 Median :16.0   
## Mean :19.39 Mean :15.72 Mean :16.9   
## 3rd Qu.:22.00 3rd Qu.:19.00 3rd Qu.:20.0   
## Max. :28.00 Max. :27.00 Max. :26.0   
## Price   
## Min. : 8.00   
## 1st Qu.:25.00   
## Median :35.00   
## Mean :36.55   
## 3rd Qu.:47.00   
## Max. :80.00

ZagatSD <- apply(data1[,2:5],2,sd)#2 means the manipulation is performed on columns  
ZagatVAR <- apply(data1[,2:5],2,var)  
  
#####find the weights based on correlation####  
cor <- cor(data1[,2:5]) #get correaltion  
TOTAL\_c = sum(cor[which(cor!=1)] ) #sum up all the correaltion coefficient without themselves  
foodWeight\_c = sum(cor[1,which(cor[1,]!=1)])/TOTAL\_c  
decorWeight\_c = sum(cor[2,which(cor[2,]!=1)])/TOTAL\_c  
serviceWeight\_c = sum(cor[3,which(cor[3,]!=1)])/TOTAL\_c  
priceWeight\_c = sum(cor[4,which(cor[4,]!=1)])/TOTAL\_c  
TOTAL\_c

## [1] 7.928564

foodWeight\_c

## [1] 0.2031008

decorWeight\_c

## [1] 0.2355963

serviceWeight\_c

## [1] 0.2881747

priceWeight\_c

## [1] 0.2731282

######find the weights based on sd#######  
Total\_sd = sum(ZagatSD)  
foodWeight\_sd = ZagatSD[1]/Total\_sd  
decorWeight\_sd = ZagatSD[2]/Total\_sd  
serviceWeight\_sd = ZagatSD[3]/Total\_sd  
priceWeight\_sd = ZagatSD[4]/Total\_sd  
Total\_sd

## [1] 27.08592

foodWeight\_sd

## Food   
## 0.1363323

decorWeight\_sd

## Decor   
## 0.1827491

serviceWeight\_sd

## Service   
## 0.1316829

priceWeight\_sd

## Price   
## 0.5492356

#######Combine Two Wights together to get the cor&sd weights#######  
foodWeight = (foodWeight\_c+foodWeight\_sd)/2  
decorWeight = (decorWeight\_c+decorWeight\_sd)/2  
serviceWeight = (serviceWeight\_c+serviceWeight\_sd)/2  
priceWeight = (priceWeight\_c+priceWeight\_sd)/2  
foodWeight

## Food   
## 0.1697166

decorWeight

## Decor   
## 0.2091727

serviceWeight

## Service   
## 0.2099288

priceWeight

## Price   
## 0.4111819

####get the summary of two sections####  
finalRaiting<-data.frame() #create a new data frame  
finalRaiting<-data.frame("Name"= data1$Name, "Raiting"=priceWeight\*data1$Price+foodWeight\*data1$Food+decorWeight\*data1$Decor+serviceWeight\*data1$Service,"Food"=data1$Food,"Decor"=data1$Decor,'Service'=data1$Service,'Price'=data1$Price) #put into the data frame the Names of restaurants and the general raiting of them  
finalRaiting

## Name Raiting Food Decor Service Price  
## 1 107 West 19.48430 16 13 16 26  
## 2 2nd Street cafe 16.87903 14 13 15 21  
## 3 44 & Hell's kitchen 28.96633 22 19 19 42  
## 4 55 wall 34.77818 21 22 21 54  
## 5 55 wall street 34.77818 21 22 21 54  
## 6 92 26.51309 15 15 15 43  
## 7 Angelica kitchen 18.51768 20 14 15 22  
## 8 Angelo's 17.84995 21 11 14 22  
## 9 Avenue 23.72487 18 14 14 36  
## 10 Avra estiatorio 33.22350 24 21 20 50  
## 11 AZ 38.42215 23 25 22 60  
## 12 babbo 41.56962 27 23 24 66  
## 13 Baldoria 31.73156 19 16 18 52  
## 14 Bali Nusa Indah 19.16468 19 10 17 25  
## 15 bambou 31.28596 21 24 20 45  
## 16 banjara 22.96191 23 16 20 28  
## 17 Bar 89 22.25229 14 22 14 30  
## 18 Bar Pitti 23.42033 21 14 16 33  
## 19 Barbetta 35.01888 20 23 20 55  
## 20 Barkling dog 16.62964 15 12 14 21  
## 21 Bay Leaf 25.91042 21 18 18 36  
## 22 bayards 39.65645 23 24 23 63  
## 23 Bella Blu 26.82815 18 17 16 41  
## 24 Bello 27.41924 19 15 20 41  
## 25 Ben Benson 35.91773 23 17 20 59  
## 26 big wong 11.60468 22 3 11 12  
## 27 bindex dinner 14.56582 15 11 13 17  
## 28 Blue evolution 21.56094 16 20 15 28  
## 29 Bo-ky 10.33549 17 4 8 12  
## 30 Bolo 33.49725 22 20 20 52  
## 31 Bond Street 34.82726 25 22 18 54  
## 32 Bondi Restaurant 26.76584 20 16 19 39  
## 33 Borgo antico 26.42565 18 17 18 39  
## 34 Bottino 28.44851 19 19 17 43  
## 35 Bouchon 26.70201 22 17 20 37  
## 36 Bravo Gianni 36.97515 22 14 21 63  
## 37 bridge cafe 27.34674 21 16 19 40  
## 38 Brooklin Diner USA 20.12827 15 13 14 29  
## 39 Brother Jimmy's BBQ 16.41255 15 10 13 22  
## 40 Bryant Park Grill 27.32541 16 21 16 41  
## 41 Bubby's 20.02423 18 14 14 27  
## 42 Burger Heaven 13.52712 15 8 13 16  
## 43 cabana 24.43541 22 18 18 32  
## 44 Cafe greco 21.95931 16 14 17 31  
## 45 Cafè Pierre 39.88146 23 27 25 61  
## 46 cafeteria 21.33593 16 17 13 30  
## 47 canton 27.46342 23 10 20 42  
## 48 Charely O's 18.84475 10 10 11 31  
## 49 Chelsea Grill 16 18.45201 16 13 15 24  
## 50 Chez Oscar 21.95780 16 16 15 31  
## 51 China Fun 14.96191 15 8 12 20  
## 52 China Grill 32.46421 22 21 18 50  
## 53 Ciao Europa 28.73019 17 19 18 44  
## 54 City crab and seafood 24.82891 16 14 15 39  
## 55 Col Legno 24.04220 21 13 18 34  
## 56 Confort Dinner, the 15.38818 15 11 13 19  
## 57 Cornelia St. cafe 22.12827 17 15 16 31  
## 58 da Nico 24.87889 21 17 18 34  
## 59 Dallas bbq 14.38102 14 8 12 19  
## 60 delmonico's 33.39929 19 20 20 53  
## 61 Demarchelier 27.10191 16 16 16 43  
## 62 dim sum go go 17.71894 19 13 13 22  
## 63 Dishes 13.56050 20 10 13 13  
## 64 district 33.12553 21 21 20 51  
## 65 do jo 11.90600 14 7 11 14  
## 66 dok suni's 20.95248 21 15 15 27  
## 67 Don Peppe 25.22196 22 8 18 39  
## 68 dt.ut 15.14383 17 19 14 13  
## 69 Dukes 17.62172 16 12 14 23  
## 70 Dylan Prime 36.15706 23 24 22 55  
## 71 E.A.T 22.63804 19 10 12 36  
## 72 east of eighth 20.93418 16 16 16 28  
## 73 East Post 22.28154 19 18 18 28  
## 74 Eatery 22.33669 17 17 15 31  
## 75 Ecco 30.23293 21 17 20 46  
## 76 Ecco la 20.26645 17 13 15 28  
## 77 Edgards 17.53201 19 17 14 19  
## 78 Edison cafè 13.75991 14 8 11 18  
## 79 El faro 23.40600 21 10 16 35  
## 80 El malecon 13.16653 19 6 12 15  
## 81 El Ponte 23.62461 21 10 19 34  
## 82 El Quijote 24.10527 19 13 16 36  
## 83 El Teddy's 24.05241 15 18 14 36  
## 84 Elaine's 26.02040 11 12 13 46  
## 85 Elio's 33.65189 23 17 19 54  
## 86 Ellen's Stardust Diner 16.78031 11 14 14 22  
## 87 Empire diner 17.24849 15 15 12 22  
## 88 empire Szechuan 15.58302 15 8 13 21  
## 89 Erminia's 37.94789 25 25 24 57  
## 90 Esca 36.09461 24 19 20 58  
## 91 Esperanto 22.20187 21 17 17 28  
## 92 Ess a bajel 11.37906 23 5 13 9  
## 93 Etats Units 33.82312 24 15 21 54  
## 94 Fanelli's cafe 17.28946 14 14 14 22  
## 95 Felix 24.62539 16 17 13 38  
## 96 Ferrara 16.00246 21 13 13 17  
## 97 Ferrara 16.00246 21 13 13 17  
## 98 Ferrier bistro 25.16759 18 15 14 39  
## 99 First 27.59461 20 19 18 40  
## 100 Fish 25.92763 20 14 17 39  
## 101 five points 29.42489 21 21 20 42  
## 102 Florent 20.43541 18 14 14 28  
## 103 Four Season 47.59063 26 27 26 78  
## 104 Frank 21.49392 23 14 15 28  
## 105 Fred's 21.31383 17 16 17 28  
## 106 French Roast 17.27286 14 13 11 24  
## 107 Fresco By scotto 33.49801 22 19 21 52  
## 108 Frutti di Mare 18.45276 16 12 16 24  
## 109 Garage restaurant 24.17565 18 19 19 32  
## 110 Gascogne 31.27163 21 20 20 47  
## 111 Gennaro 23.92232 24 12 16 34  
## 112 ghenet 19.38102 19 13 17 24  
## 113 Giambelli 33.35267 20 17 20 54  
## 114 Gigino Trattoria 26.94272 21 18 19 38  
## 115 Gino 26.71922 21 13 19 40  
## 116 Girasole 33.58697 19 15 20 56  
## 117 Global 33 23.53794 18 18 15 33  
## 118 gnocco caffe 23.64534 21 17 18 31  
## 119 Go Sushi 12.72837 14 7 11 16  
## 120 golden unicorn 17.25246 20 10 11 23  
## 121 goodi's 14.40799 19 7 13 17  
## 122 Googie's 15.79144 15 10 12 21  
## 123 Gotham 40.96435 27 25 25 63  
## 124 Grand Sichuan 17.97305 23 8 14 23  
## 125 Great NY noodle 12.87768 21 4 11 15  
## 126 Haikara Grill 28.99071 21 17 18 44  
## 127 Hard Rock Cafe 20.04312 12 19 12 28  
## 128 Hog Pit bbq 16.58227 16 10 13 22  
## 129 Houlihan's 16.37766 10 10 11 25  
## 130 Hourglass Tavern 19.55605 14 13 16 27  
## 131 Ike 21.77163 16 19 17 28  
## 132 il cortile 30.64260 21 19 18 47  
## 133 il giglio 37.71647 25 19 23 60  
## 134 Il mulino 43.81321 27 18 24 74  
## 135 Il palazzo 28.06506 24 17 19 40  
## 136 Industry 28.62919 14 23 14 45  
## 137 Jackson Hole 15.13955 16 9 13 19  
## 138 Japonica 26.46908 22 13 17 40  
## 139 Jerry's 20.08882 16 12 14 29  
## 140 jewel bako 39.55241 26 25 23 61  
## 141 jo jo 40.60115 25 22 22 66  
## 142 Justin's 24.43130 16 19 14 36  
## 143 Kam chueh 18.84279 22 10 15 24  
## 144 Kiev 13.34948 14 7 12 17  
## 145 Kitchen Club 29.37752 22 19 19 43  
## 146 La belle Epoque 26.77529 14 22 14 41  
## 147 La bonne Soupe 19.02499 17 12 14 26  
## 148 Landmark Tavern 24.30255 14 18 16 36  
## 149 Le singe vert 23.77224 17 16 15 35  
## 150 Lemon, the 22.26950 13 18 13 33  
## 151 L'Express 20.46695 17 14 13 29  
## 152 Lipstick cafe 18.24208 16 13 14 24  
## 153 Lola 28.89915 18 20 17 44  
## 154 Lombardi 17.50520 25 11 15 19  
## 155 L'orto ristorante elegante 36.65127 27 25 26 52  
## 156 Lundy Bros. 24.86761 15 16 14 39  
## 157 lusardi's 34.70002 23 19 22 54  
## 158 Luzia's 21.74146 16 13 15 32  
## 159 Magnolia Bakery 12.35317 25 10 13 8  
## 160 Mangia e bevi 20.12903 15 12 15 29  
## 161 Manhattan Chili co. 17.04083 15 12 14 22  
## 162 mark joseph 37.95794 24 19 23 61  
## 163 Martini's 23.80454 16 15 15 36  
## 164 Marumi 20.73615 21 12 15 28  
## 165 Mary Ann's 17.65326 15 12 13 24  
## 166 Master grill international 22.15265 16 13 15 33  
## 167 Max 20.47823 23 15 17 24  
## 168 Maya 2112 32.15967 25 21 20 47  
## 169 Meet 28.76021 16 21 15 45  
## 170 Merchants, ny 21.02879 13 16 13 31  
## 171 Merseille 31.64260 22 20 19 48  
## 172 Mesa Grill 32.84461 23 20 20 50  
## 173 Metisse 27.14548 21 16 20 39  
## 174 Metsovo 26.62614 18 18 16 40  
## 175 Mexican Radio 21.02423 19 15 15 28  
## 176 Mexicana Mama 21.82695 25 11 16 29  
## 177 Mezzaluna 24.37827 17 13 15 38  
## 178 Mezzogiorno 26.58669 19 17 16 40  
## 179 Mi Cocina 28.30577 23 18 18 41  
## 180 Micheal's 36.00456 21 20 21 58  
## 181 Mickey Mantle's 22.10054 12 17 14 33  
## 182 Milos Estiatorio 40.81033 25 23 22 66  
## 183 Mingala Burmese 17.93830 19 12 17 21  
## 184 Miss Saigon 20.02574 18 12 16 27  
## 185 Mitali 19.41255 18 13 16 25  
## 186 Molyvos 32.43343 23 20 20 49  
## 187 Monkey Bar 33.59978 19 21 18 54  
## 188 Monsoon 20.40388 19 14 15 27  
## 189 Montrachet 40.80468 25 19 24 67  
## 190 Mooza 24.64839 16 21 15 35  
## 191 Morton's of Chicago 36.99739 22 19 22 60  
## 192 Mr. Chow 38.18922 23 21 19 63  
## 193 Mughlai 22.05652 19 15 16 30  
## 194 Nanni 32.79234 24 13 22 52  
## 195 Naples 45 21.29799 17 14 15 30  
## 196 Neary's 24.25820 15 12 19 37  
## 197 Negril 22.67612 19 17 15 31  
## 198 Nellie's 28.96709 22 18 20 42  
## 199 Nello 34.63985 18 18 15 60  
## 200 new green bo 13.66851 22 4 12 16  
## 201 Nha trang 14.15936 20 5 13 17  
## 202 Nice restaurant 17.74407 18 10 13 24  
## 203 Nino's 35.32113 23 19 23 55  
## 204 Nino's positano 29.65203 20 17 20 45  
## 205 Nobu 45.02879 28 23 24 74  
## 206 Nocello 27.14473 21 17 19 39  
## 207 Noho star 19.67688 16 13 13 28  
## 208 Noodles on 28 14.44028 18 6 13 18  
## 209 Norma's 26.40388 25 20 21 33  
## 210 O.G. 23.59872 22 14 18 32  
## 211 Oak room 37.56564 18 24 21 61  
## 212 Oceana 44.87491 27 25 26 72  
## 213 Oceana 44.87491 27 25 26 72  
## 214 Old Homestead 33.27375 22 15 20 54  
## 215 Old Town Bar 17.46634 15 16 14 21  
## 216 Olives 35.56033 22 22 20 56  
## 217 Omen 31.60390 23 18 20 48  
## 218 Omonia cafe 15.67095 19 14 14 16  
## 219 Omonia cafè 15.67095 19 14 14 16  
## 220 Orso 31.63543 22 18 19 49  
## 221 Orso 31.63543 22 18 19 49  
## 222 Oscar 24.46586 15 15 17 37  
## 223 Oscar's 24.46586 15 15 17 37  
## 224 Osteria del circo 35.39853 21 23 21 55  
## 225 Otabe 32.64335 23 20 21 49  
## 226 Oyster bar 27.91028 22 16 15 43  
## 227 Park av. Cafè 38.75517 25 22 23 61  
## 228 Payard bistro 32.39246 24 21 18 49  
## 229 Pearl Oyster 26.32633 26 12 18 38  
## 230 peasant 30.85177 21 20 18 47  
## 231 Planet Sushy 20.26721 17 12 16 28  
## 232 Pump Energy food, the 11.93449 19 4 14 12  
## 233 Puttanesca 22.70917 18 15 16 32  
## 234 quartino 25.44333 23 20 20 32  
## 235 Rachel's American Bistro 23.91194 19 14 18 34  
## 236 Red 22.16057 16 14 16 32  
## 237 Ribollita 24.34598 18 14 15 37  
## 238 Roy's new york 33.64335 24 21 22 50  
## 239 Sel et Poivre 26.48948 16 16 17 41  
## 240 Serafina 24.97350 18 17 15 37  
## 241 Soho Steak 23.52437 18 13 16 35  
## 242 Sylvia's 19.92778 15 12 16 28  
## 243 T.G.I Friday 15.57891 9 9 9 25  
## 244 Taka 29.62371 26 13 19 45  
## 245 tasting room 34.18706 26 17 25 51  
## 246 thailand 16.94868 23 9 14 20  
## 247 the elephant 24.41882 22 17 15 34  
## 248 the tonic 34.12553 22 22 21 52  
## 249 torre di pisa 32.79326 19 23 20 50  
## 250 Tossed 13.66454 17 9 13 15  
## 251 triangolo 23.92061 19 14 20 33  
## 252 Tsampa 20.04723 18 18 16 24  
## 253 Tsampa 20.04723 18 18 16 24  
## 254 tse yang 37.01964 22 24 23 57  
## 255 Tupelo Grill 27.65919 18 17 18 42  
## 256 Turkish Kitchen 27.32161 22 19 19 38  
## 257 Turkuaz 24.96496 19 21 18 33  
## 258 Tuscan square 28.27879 18 19 17 43  
## 259 Tuscan steak 34.77666 21 24 19 54  
## 260 Two Boots 13.39078 19 10 13 13  
## 261 two two two 37.44728 21 21 21 61  
## 262 Ulrika's 30.03168 21 17 21 45  
## 263 Uncle Nick's 20.59872 19 11 15 29  
## 264 Uncle pho 22.74863 17 16 16 32  
## 265 Union Pacific 44.70444 26 26 25 72  
## 266 Utsav 25.91759 21 20 18 35  
## 267 Vatan 25.53092 21 22 22 31  
## 268 Vaya 14.68925 23 12 12 14  
## 269 Vegetarian Paradise 16.44820 20 9 16 19  
## 270 veniero's 14.68925 23 12 12 14  
## 271 Verbena 35.97227 22 21 21 57  
## 272 Veritas 47.53685 27 22 26 80  
## 273 Vermicelli 23.47563 20 17 18 31  
## 274 Via Oreto 27.58820 20 16 19 41  
## 275 Viand 14.31946 16 6 16 17  
## 276 Vietnam 14.67643 23 6 14 16  
## 277 View, the 33.48461 17 25 19 52  
## 278 Village 27.45643 18 19 17 41  
## 279 Vince and eddie 27.86120 18 16 18 43  
## 280 Vincent's 22.87172 19 13 16 33  
## 281 vinnie's pizza 10.86274 20 3 13 10  
## 282 Vivolo 28.48156 18 17 18 44  
## 283 Vong 38.18068 24 25 22 59  
## 284 Vynl 18.63681 17 16 16 22  
## 285 W. 79th st. Boat Basin cafe 17.81674 11 20 11 23  
## 286 walker's 19.07312 16 13 16 25  
## 287 wallsè 36.47425 25 19 21 58  
## 288 White horse tavern 15.08745 12 13 12 19  
## 289 White Horse Tavern 15.08745 12 13 12 19  
## 290 Willow 30.13345 18 19 18 47  
## 291 wolf's 17.65402 15 11 14 24  
## 292 wong kee 13.70872 21 4 13 16  
## 293 X.o 15.00397 20 10 14 16  
## 294 Xunta 19.36366 19 13 13 26  
## 295 York Grill 29.39335 22 21 21 41  
## 296 Zarela 26.92688 21 16 17 40  
## 297 Zen Palate 20.45125 18 16 16 26  
## 298 Zocalo 23.70125 19 15 16 34  
## 299 Zoe 30.65052 21 20 19 46  
## 300 Zuni 22.70201 18 13 16 33

summary(finalRaiting$Raiting)#get summary for finalRaiting raiting

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 10.34 19.14 24.22 25.15 30.70 47.59

aboveAverage<-subset(finalRaiting,finalRaiting$Raiting>mean(finalRaiting[,2])) #get 'above average' section   
belowAverage<-subset(finalRaiting,finalRaiting$Raiting<mean(finalRaiting[,2])) #get 'below average' section  
#Compute and compare the summary statistics for 2 segments   
summary(aboveAverage)#summary for 'above Average' raiting

## Name Raiting Food Decor   
## Oceana : 2 Min. :25.17 Min. :11.0 Min. : 8.00   
## Orso : 2 1st Qu.:27.61 1st Qu.:20.0 1st Qu.:17.00   
## 44 & Hell's kitchen: 1 Median :31.95 Median :22.0 Median :19.00   
## 55 wall : 1 Mean :32.43 Mean :21.6 Mean :19.32   
## 55 wall street : 1 3rd Qu.:35.83 3rd Qu.:23.0 3rd Qu.:22.00   
## 92 : 1 Max. :47.59 Max. :28.0 Max. :27.00   
## (Other) :126   
## Service Price   
## Min. :13.00 Min. :31   
## 1st Qu.:18.00 1st Qu.:42   
## Median :20.00 Median :49   
## Mean :19.84 Mean :50   
## 3rd Qu.:21.00 3rd Qu.:56   
## Max. :26.00 Max. :80   
##

summary(belowAverage)#summary for 'below average' raiting

## Name Raiting Food Decor   
## Ferrara : 2 Min. :10.34 Min. : 9.0 Min. : 3.00   
## Tsampa : 2 1st Qu.:16.39 1st Qu.:15.0 1st Qu.:10.00   
## 107 West : 1 Median :19.98 Median :17.5 Median :13.00   
## 2nd Street cafe : 1 Mean :19.28 Mean :17.6 Mean :12.82   
## Angelica kitchen: 1 3rd Qu.:22.56 3rd Qu.:19.0 3rd Qu.:15.00   
## Angelo's : 1 Max. :24.97 Max. :25.0 Max. :22.00   
## (Other) :158   
## Service Price   
## Min. : 8.00 Min. : 8.00   
## 1st Qu.:13.00 1st Qu.:20.25   
## Median :14.50 Median :26.50   
## Mean :14.52 Mean :25.69   
## 3rd Qu.:16.00 3rd Qu.:32.00   
## Max. :20.00 Max. :39.00   
##

top25<-subset(finalRaiting,finalRaiting$Raiting>=30.70)#get top 25% data which are >= 3rd quartile  
bottom25<-subset(finalRaiting,finalRaiting$Raiting<=19.14) #get bottom 25% data which are <= 1st quartile  
#get summary for both top25% and bottom25%  
summary(top25)

## Name Raiting Food Decor   
## Oceana : 2 Min. :30.85 Min. :17.00 Min. :13.00   
## Orso : 2 1st Qu.:33.31 1st Qu.:21.00 1st Qu.:19.00   
## 55 wall : 1 Median :35.02 Median :23.00 Median :21.00   
## 55 wall street : 1 Mean :36.19 Mean :22.95 Mean :20.93   
## Avra estiatorio: 1 3rd Qu.:38.07 3rd Qu.:25.00 3rd Qu.:23.00   
## AZ : 1 Max. :47.59 Max. :28.00 Max. :27.00   
## (Other) :67   
## Service Price   
## Min. :15.00 Min. :45.00   
## 1st Qu.:20.00 1st Qu.:52.00   
## Median :21.00 Median :55.00   
## Mean :21.31 Mean :57.01   
## 3rd Qu.:23.00 3rd Qu.:61.00   
## Max. :26.00 Max. :80.00   
##

summary(bottom25)

## Name Raiting Food Decor   
## Ferrara : 2 Min. :10.34 Min. : 9.00 Min. : 3.00   
## 2nd Street cafe : 1 1st Qu.:14.24 1st Qu.:15.00 1st Qu.: 8.00   
## Angelica kitchen: 1 Median :15.67 Median :17.00 Median :10.00   
## Angelo's : 1 Mean :15.65 Mean :17.35 Mean :10.23   
## Barkling dog : 1 3rd Qu.:17.52 3rd Qu.:20.00 3rd Qu.:13.00   
## big wong : 1 Max. :19.07 Max. :25.00 Max. :20.00   
## (Other) :68   
## Service Price   
## Min. : 8.00 Min. : 8.00   
## 1st Qu.:12.00 1st Qu.:16.00   
## Median :13.00 Median :19.00   
## Mean :13.11 Mean :19.01   
## 3rd Qu.:14.00 3rd Qu.:22.00   
## Max. :17.00 Max. :31.00   
##

Business Questions:

1. Describe in your index in English (marketing lingo).

Based on variance and standard deviation, we can say that the difference of customers’ ratings for food, décor and service are not huge. The main way that customers differ the restaurants are based on the price which has lager variance. Price and service also have slightly higher correlation with other features. Depending both standard deviation and correlation, the weights are given:

Food 0.1697166 Decor 0.2091727

Service 0.2099288 Price 0.4111819

Price is the most important feature to differ the customers’ final ratings.

2. Using your index, how can a restaurant become more profitable?

*Since the huge variance of price, restaurants which provide affordable and nice price are able to get higher ratings and profit efficiently and easily than those focusing on food, décor and service.*

3.Describe the characteristics of restaurant operating at the bottom 25% and top 25% of your index.

Both bottom 25% and top 25% has 75 restaurants, the difference between four features average are: FOOD—5; DÉCOR---11;SERVICE---8,PRICE---36. We can directly say that bottom 25% has very bad price ratings than top 25%. However, their food quality seems similar .

4. If you were hired to advise a new restaurant operator, what would you recommend in terms of the balance & trade-offs between food, decor, service, and price?

From comparison between 25% bottom and 25% top restaurants, I would suggest that the restaurant should pay more attention to price setting and adjusting and do not spend too much time in improving food quality.