 # (a) Approximately how many occupied square feet does each property have?

```
> totSF <- wpg$`Total Center SF`
> OCC <- wpg$`Occupancy Pct`
> totSF-OCC
 [1]  670741.12   86938.00  195337.17  434524.05  571242.05  869935.12  764563.06
 [8]  578205.23  435414.18   42247.00  577613.08 1048427.07 1447658.09 1049981.10
[15]  646740.11 1245009.10  556778.20 1051951.02  583036.12  745041.05  422996.21
[22]  713707.10  646517.09   31513.49 1037942.07  567891.03  903984.16  390021.02
[29]  716992.13  803761.11  555349.21  637794.20  505028.16  644534.10  669758.08
[36]  847426.08  316872.06  952345.01  924303.08  555309.06 1302418.04 1372971.05
[43]  777531.09  883095.04  736930.14 1109750.05  774023.14 1168833.25  578282.10
[50]  918474.34 1081540.06  670621.07  967211.02  846914.01 1216694.14 1093692.09
[57]  675987.04  106635.00  199814.00  279580.07  240719.00  403454.00  168612.00
[64]  101914.07  301437.00  239482.13  364468.00  433815.17  197434.00  513570.02
[71]  152152.00  107367.00   36456.00  215589.05  364547.06  386197.01  233877.01
[78]  303525.00  139801.14  440773.05   90526.00  102104.01  273835.49  171620.14
[85]  171491.02  204955.13  389617.03  309414.00  516099.00  229928.00  306439.00
[92]  178713.07  309008.00  365168.02  388324.06   90521.00  150440.03  557537.00
[99]  512347.01   50106.11  379219.03  163258.14  385413.01  603474.01  632101.01
```

#(b) Sort the shopping malls by occupied square footage. Which shopping malls are the five largest by this measure?

```
tcsf <- wpg%>%
  select(`Total Center SF`,Name)%>%
  arrange(tcsf)
#Westminster Mall
#Great Lakes Mall
```

#Pearlridge Center

#Polaris Fashion Place

#Dayton Mall

#(c) Consider malls that are enclosed versus those that are open air. Which type of mall is larger, on average? Provide a calculation in support of your answer.

```
onpVSclsd <- wpg%>%
  select(`Total Center SF`,Type)
OPN<-onpVSclsd%>%
  filter(Type=="Open Air")
CLSD<-onpVSclsd%>%
  filter(Type == "Enclosed")
summary(CLSD)
 Total Center SF       Type
 Min.   :  31514   Length:56
 1st Qu.: 570405   Class :character
 Median : 726962   Mode  :character
 Mean   : 749008
 3rd Qu.: 956063
 Max.   :1447659
 summary(OPN)
 Total Center SF      Type
 Min.   : 36457   Length:49
 1st Qu.:168613   Class :character
 Median :273836   Mode  :character
 Mean   :288549
```

3rd Qu.:386198

Max. :675988

#(d) Create a categorical variable in the tibble that is called LargeMall, which takes one value when a mall is either enclosed and larger than 1000000 SF, or open air and larger than 500000 SF.

> LargeMall <- filter(wpg, 'Total Center SF' > 500000, Type == "Open Air"|'Total Center SF' > 1000000, Type == "Enclosed")

> View(LargeMall)

#(e) How much total money (in thousands) is still owed on open air properties, compared with those that are enclosed?

```
data %>%
group_by(open_air) %>% summarize(principal.balance)
group_by(enclosed) %>% summarize (principal.balance)
Principal.balance < - mutate (sum(enclosed) == sum(open_air))
```

(f) What is the median size of a Washington Prime Group property in each of the states? Calculate this measure separately for each state

```
states<- data %>%
  group_by(State) %>%
  summarise(`Median Size` = median(`Total Center SF`))
```

#(g) Create a tibble that displays only properties that have an outstanding mortgage principal balance, and only displays the property name, its state, and its outstanding mortgage balance.

> gtibble <- select(wpg, 'Name', 'State', 'Share of Principal Balance')%>%

+ na.omit('Share of Principal Balance')

#(h) From this tibble, how much money is owed on mortgage balances for properties in each of the states?

AZ: $112,200	CA: $141,776	CO: $56,370	FL: $219,733	GA: $21,680	HI: $136,538
IL: $214,312	IN: $43,682	KS: $50,591	MI: $12,339	MT: $35,000	NC: $27,500
NJ: $69,737	NM:$95,283	OH: $201,747	OK: $33,382	SC: $17,307	TN: $60,789
TX: $173,639	VA: $45,146	WV: $38,748			