Assignment: ASSIGNMENT 5.2

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#Analysis of housing data

Load the readxl package

library(readxl)

Load the plyr package

library(dplyr)

Set the working directory to the root of your DSC 520 directory

setwd('C:/Users/anjal/OneDrive/Desktop/MS/DSC520/dsc520')

Load the `data/acs-14-1yr-s0201.csv` to

housing_df <- read_excel("data/week-6-housing.xlsx")

str(housing_df)

```
> str(housing_df)
tibble [12,865 x 24] (S3: tbl_df/tbl/data.frame)
 $ Sale Date              : POSIXct[1:12865], format: "2006-01-03" "2006-01-03" "2006-01-03" "2006-01-03" ...
 $ sale Price             : num [1:12865] 698000 649990 572500 420000 369900 ...
 $ sale_reason            : num [1:12865] 1 1 1 1 1 1 1 1 1 1 ...
 $ sale_instrument        : num [1:12865] 3 3 3 3 3 15 3 3 3 3 ...
 $ sale_warning           : chr [1:12865] NA NA NA NA ...
 $ sitetype               : chr [1:12865] "R1" "R1" "R1" "R1" ...
 $ addr_full              : chr [1:12865] "17021 NE 113TH CT" "11927 178TH PL NE" "13315 174TH AVE NE" "3303 178TH AVE NE"
...
 $ zip5                   : num [1:12865] 98052 98052 98052 98052 98052 ...
 $ ctyname                : chr [1:12865] "REDMOND" "REDMOND" NA "REDMOND" ...
 $ postalctyn             : chr [1:12865] "REDMOND" "REDMOND" "REDMOND" "REDMOND" ...
 $ lon                    : num [1:12865] -122 -122 -122 -122 -122 ...
 $ lat                    : num [1:12865] 47.7 47.7 47.7 47.6 47.7 ...
 $ building_grade         : num [1:12865] 9 9 8 8 7 7 10 10 9 8 ...
 $ square_feet_total_living: num [1:12865] 2810 2880 2770 1620 1440 4160 3960 3720 4160 2760 ...
 $ bedrooms               : num [1:12865] 4 4 4 3 3 4 5 4 4 4 ...
 $ bath_full_count        : num [1:12865] 2 2 1 1 1 2 3 2 2 1 ...
 $ bath_half_count        : num [1:12865] 1 0 1 0 0 1 0 1 1 0 ...
 $ bath_3qtr_count        : num [1:12865] 0 1 1 1 1 1 1 0 1 1 ...
 $ year_built             : num [1:12865] 2003 2006 1987 1968 1980 ...
 $ year_renovated         : num [1:12865] 0 0 0 0 0 0 0 0 0 0 ...
 $ current_zoning         : chr [1:12865] "R4" "R4" "R6" "R4" ...
 $ sq_ft_lot              : num [1:12865] 6635 5570 8444 9600 7526 ...
 $ prop_type              : chr [1:12865] "R" "R" "R" "R" ...
 $ present_use            : num [1:12865] 2 2 2 2 2 2 2 2 2 2 ...
```

head(housing_df)

```
> head(housing_df)
# A tibble: 6 x 24
  `Sale Date`         `Sale Price` sale_reason sale_instrument sale_warning sitetype addr_full    zip5 ctyname postalctyn
  <dttm>                     <dbl>       <dbl>           <dbl> <chr>        <chr>    <chr>       <dbl> <chr>   <chr>
1 2006-01-03 00:00:00       698000           1               3 NA           R1       17021 NE 1… 98052 REDMOND REDMOND
2 2006-01-03 00:00:00       649990           1               3 NA           R1       11927 178T… 98052 REDMOND REDMOND
3 2006-01-03 00:00:00       572500           1               3 NA           R1       13315 174T… 98052 NA      REDMOND
4 2006-01-03 00:00:00       420000           1               3 NA           R1       3303 178TH… 98052 REDMOND REDMOND
5 2006-01-03 00:00:00       369900           1               3 15           R1       16126 NE 1… 98052 REDMOND REDMOND
6 2006-01-03 00:00:00       184667           1              15 1B 51        R1       8101 229TH… 98053 NA      REDMOND
# ... with 14 more variables: lon <dbl>, lat <dbl>, building_grade <dbl>, square_feet_total_living <dbl>,
#   bedrooms <dbl>, bath_full_count <dbl>, bath_half_count <dbl>, bath_3qtr_count <dbl>, year_built <dbl>,
#   year_renovated <dbl>, current_zoning <chr>, sq_ft_lot <dbl>, prop_type <chr>, present_use <dbl>
>
```

#Rename the'Sale Date` and`Sale Price`

colnames(housing_df)[1] <- "Sale_Date"

colnames(housing_df)[2] <- "Sale_Price"

str(housing_df)

```
> #Rename the'Sale Date` and`Sale Price`
> colnames(housing_df)[1] <- "Sale_Date"
> colnames(housing_df)[2] <- "Sale_Price"
> str(housing_df)
tibble [12,865 x 24] (S3: tbl_df/tbl/data.frame)
 $ Sale_Date              : POSIXct[1:12865], format: "2006-01-03" "2006-01-03" "2006-01-03" "2006-01-03" ...
 $ Sale_Price             : num [1:12865] 698000 649990 572500 420000 369900 ...
 $ sale_reason            : num [1:12865] 1 1 1 1 1 1 1 1 1 1 ...
 $ sale_instrument        : num [1:12865] 3 3 3 3 3 15 3 3 3 3 ...
 $ sale_warning           : chr [1:12865] NA NA NA NA ...
 $ sitetype               : chr [1:12865] "R1" "R1" "R1" "R1" ...
 $ addr_full              : chr [1:12865] "17021 NE 113TH CT" "11927 178TH PL NE" "13315 174TH AVE NE" "3303 178TH AVE NE"
...
 $ zip5                   : num [1:12865] 98052 98052 98052 98052 98052 ...
 $ ctyname                : chr [1:12865] "REDMOND" "REDMOND" NA "REDMOND" ...
 $ postalctyn             : chr [1:12865] "REDMOND" "REDMOND" "REDMOND" "REDMOND" ...
 $ lon                    : num [1:12865] -122 -122 -122 -122 -122 ...
 $ lat                    : num [1:12865] 47.7 47.7 47.7 47.6 47.7 ...
 $ building_grade         : num [1:12865] 9 9 8 8 7 7 10 10 9 8 ...
 $ square_feet_total_living: num [1:12865] 2810 2880 2770 1620 1440 4160 3960 3720 4160 2760 ...
 $ bedrooms               : num [1:12865] 4 4 4 3 3 4 5 4 4 4 ...
 $ bath_full_count        : num [1:12865] 2 2 1 1 1 2 3 2 2 1 ...
 $ bath_half_count        : num [1:12865] 1 0 1 0 0 1 0 1 1 0 ...
 $ bath_3qtr_count        : num [1:12865] 0 1 1 1 1 1 1 0 1 1 ...
 $ year_built             : num [1:12865] 2003 2006 1987 1968 1980 ...
 $ year_renovated         : num [1:12865] 0 0 0 0 0 0 0 0 0 0 ...
 $ current_zoning         : chr [1:12865] "R4" "R4" "R6" "R4" ...
 $ sq_ft_lot              : num [1:12865] 6635 5570 8444 9600 7526 ...
 $ prop_type              : chr [1:12865] "R" "R" "R" "R" ...
 $ present_use            : num [1:12865] 2 2 2 2 2 2 2 2 2 2 ...
>
```

a. Using the dplyr package, use the 6 different operations to analyze/transform

the data - GroupBy, Summarize, Mutate, Filter, Select, and Arrange – Remember

this isn’t just modifying data, you are learning about your data also – so play

around and start to understand your dataset in more detail

#Getting mean sale price using group_by() and summarize() functions

housing_df %>% group_by(zip5) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))

```
> #Getting mean sale price using group_by() and summarize() functions
> housing_df %>% group_by(zip5) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))
# A tibble: 4 x 2
  zip5 Avg_Sale_Price
  <db1>          <db1>
1 98052        649375.
2 98053        672624.
3 98059        645000
4 98074        951544.
```

#Getting mean sale price using group_by() and summarize() functions

housing_df %>% group_by(zip5,ctyname) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))

```
> #Getting mean sale price using group_by() and summarize() functions
> housing_df %>% group_by(zip5,ctyname) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))
`summarise()` has grouped output by 'zip5'. You can override using the `.groups` argument.
# A tibble: 6 x 3
# Groups:   zip5 [4]
  zip5 ctyname   Avg_Sale_Price
  <db1> <chr>              <db1>
1 98052 REDMOND          644803.
2 98052 NA               691413.
3 98053 NA               672624.
4 98059 NA               645000
5 98074 SAMMAMISH        972480.
6 98074 NA               754143.
```

#Getting mean sale price using group_by() and summarize() functions

housing_df %>% group_by(bedrooms) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))

```
> #Getting mean sale price using group_by() and summarize() functions
> housing_df %>% group_by(bedrooms) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))
# A tibble: 12 x 2
   bedrooms Avg_Sale_Price
      <db1>          <db1>
 1        0         844059.
 2        1         722814.
 3        2         544946.
 4        3         564959.
 5        4         735910.
 6        5         836974.
 7        6         767494.
 8        7        1307282.
 9        8        1122500
10        9         581500
11       10         450000
12       11        1825000
```

#Getting mean sale price using group_by() and summarize() functions

housing_df %>% group_by(year_built) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))

```
> #Getting mean sale price using group_by() and summarize() functions
> housing_df %>% group_by(year_built) %>% summarize("Avg_Sale_Price" = mean(Sale_Price))
# A tibble: 109 x 2
   year_built Avg_Sale_Price
        <dbl>          <dbl>
 1       1900        394500.
 2       1903        430000
 3       1905        620000
 4       1906        550000
 5       1909          1070
 6       1910        150000
 7       1912        619667.
 8       1913        457500
 9       1914        835000
10       1915        228150
# ... with 99 more rows
>
```

#Calculate sales_price_per_sqft using mutate() function

housing_df<-housing_df %>% mutate("sales_price_per_sqft"=square_feet_total_living/Sale_Price)

str(housing_df)

```
> str(housing_df)
tibble [12,865 x 25] (S3: tbl_df/tbl/data.frame)
 $ Sale_Date              : POSIXct[1:12865], format: "2006-01-03" "2006-01-03" "2006-01-03" "2006-01-03" ...
 $ Sale_Price             : num [1:12865] 698000 649990 572500 420000 369900 ...
 $ sale_reason            : num [1:12865] 1 1 1 1 1 1 1 1 1 1 ...
 $ sale_instrument        : num [1:12865] 3 3 3 3 3 15 3 3 3 3 ...
 $ sale_warning           : chr [1:12865] NA NA NA NA ...
 $ sitetype               : chr [1:12865] "R1" "R1" "R1" "R1" ...
 $ addr_full              : chr [1:12865] "17021 NE 113TH CT" "11927 178TH PL NE" "13315 174TH AVE NE" "3303 178TH AVE NE"
 ...
 $ zip5                   : num [1:12865] 98052 98052 98052 98052 98052 ...
 $ ctyname                : chr [1:12865] "REDMOND" "REDMOND" NA "REDMOND" ...
 $ postalctyn             : chr [1:12865] "REDMOND" "REDMOND" "REDMOND" "REDMOND" ...
 $ lon                    : num [1:12865] -122 -122 -122 -122 -122 ...
 $ lat                    : num [1:12865] 47.7 47.7 47.7 47.6 47.7 ...
 $ building_grade         : num [1:12865] 9 9 8 8 7 7 10 10 9 8 ...
 $ square_feet_total_living: num [1:12865] 2810 2880 2770 1620 1440 4160 3960 3720 4160 2760 ...
 $ bedrooms               : num [1:12865] 4 4 4 3 3 4 5 4 4 4 ...
 $ bath_full_count        : num [1:12865] 2 2 1 1 1 2 3 2 2 1 ...
 $ bath_half_count        : num [1:12865] 1 0 1 0 0 1 0 1 1 0 ...
 $ bath_3qtr_count        : num [1:12865] 0 1 1 1 1 1 1 0 1 1 ...
 $ year_built             : num [1:12865] 2003 2006 1987 1968 1980 ...
 $ year_renovated         : num [1:12865] 0 0 0 0 0 0 0 0 0 0 ...
 $ current_zoning         : chr [1:12865] "R4" "R4" "R6" "R4" ...
 $ sq_ft_lot              : num [1:12865] 6635 5570 8444 9600 7526 ...
 $ prop_type              : chr [1:12865] "R" "R" "R" "R" ...
 $ present_use            : num [1:12865] 2 2 2 2 2 2 2 2 2 2 ...
 $ sales_price_per_sqft   : num [1:12865] 0.00403 0.00443 0.00484 0.00386 0.00389 ...
>
```

#Calculate sales_year using mutate() function

housing_df<-housing_df %>% mutate("sale_year"=substr(Sale_Date,1,4))

```
> #Calculate sales_year using mutate() function
> housing_df<-housing_df %>% mutate("sale_year"=substr(Sale_Date,1,4))
> str(housing_df)
tibble [12,865 x 26] (S3: tbl_df/tbl/data.frame)
 $ Sale_Date              : POSIXct[1:12865], format: "2006-01-03" "2006-01-03" "2006-01-03" "2006-01-03" ...
 $ Sale_Price             : num [1:12865] 698000 649990 572500 420000 369900 ...
 $ sale_reason            : num [1:12865] 1 1 1 1 1 1 1 1 1 1 ...
 $ sale_instrument        : num [1:12865] 3 3 3 3 3 15 3 3 3 3 ...
 $ sale_warning           : chr [1:12865] NA NA NA NA ...
 $ sitetype               : chr [1:12865] "R1" "R1" "R1" "R1" ...
 $ addr_full              : chr [1:12865] "17021 NE 113TH CT" "11927 178TH PL NE" "13315 174TH AVE NE" "3303 178TH AVE NE"
...
 $ zip5                   : num [1:12865] 98052 98052 98052 98052 98052 ...
 $ ctyname                : chr [1:12865] "REDMOND" "REDMOND" NA "REDMOND" ...
 $ postalctyn             : chr [1:12865] "REDMOND" "REDMOND" "REDMOND" "REDMOND" ...
 $ lon                    : num [1:12865] -122 -122 -122 -122 -122 ...
 $ lat                    : num [1:12865] 47.7 47.7 47.7 47.6 47.7 ...
 $ building_grade         : num [1:12865] 9 9 8 8 7 7 10 10 9 8 ...
 $ square_feet_total_living: num [1:12865] 2810 2880 2770 1620 1440 4160 3960 3720 4160 2760 ...
 $ bedrooms               : num [1:12865] 4 4 4 3 3 4 5 4 4 4 ...
 $ bath_full_count        : num [1:12865] 2 2 1 1 1 2 3 2 2 1 ...
 $ bath_half_count        : num [1:12865] 1 0 1 0 0 1 0 1 1 0 ...
 $ bath_3qtr_count        : num [1:12865] 0 1 1 1 1 1 1 0 1 1 ...
 $ year_built             : num [1:12865] 2003 2006 1987 1968 1980 ...
 $ year_renovated         : num [1:12865] 0 0 0 0 0 0 0 0 0 0 ...
 $ current_zoning         : chr [1:12865] "R4" "R4" "R6" "R4" ...
 $ sq_ft_lot              : num [1:12865] 6635 5570 8444 9600 7526 ...
 $ prop_type              : chr [1:12865] "R" "R" "R" "R" ...
 $ present_use            : num [1:12865] 2 2 2 2 2 2 2 2 2 2 ...
 $ sales_price_per_sqft   : num [1:12865] 0.00403 0.00443 0.00484 0.00386 0.00389 ...
 $ sale_year              : chr [1:12865] "2006" "2006" "2006" "2006" ...
```

#Filer all 4-berroom houses using filter() function

housing_df %>% filter(bedrooms==4)

```
> #Filer all 4-berroom houses using filter() function
> housing_df %>% filter(bedrooms==4)
# A tibble: 5,515 x 26
   Sale_Date           Sale_Price sale_reason sale_instrument sale_warning sitetype addr_full      zip5 ctyname postalctyn
   <dttm>                   <dbl>       <dbl>           <dbl> <chr>        <chr>    <chr>         <dbl> <chr>   <chr>
 1 2006-01-03 00:00:00     698000           1               3 NA           R1       17021 NE 11~ 98052 REDMOND REDMOND
 2 2006-01-03 00:00:00     649990           1               3 NA           R1       11927 178TH~ 98052 REDMOND REDMOND
 3 2006-01-03 00:00:00     572500           1               3 NA           R1       13315 174TH~ 98052 NA      REDMOND
 4 2006-01-03 00:00:00     184667           1              15 18 51        R1       8101 229TH ~ 98053 NA      REDMOND
 5 2006-01-04 00:00:00     875000           1               3 NA           R1       21404 NE 67~ 98053 NA      REDMOND
 6 2006-01-04 00:00:00     660000           1               3 NA           R1       7525 238TH ~ 98053 NA      REDMOND
 7 2006-01-04 00:00:00     650000           1               3 NA           R1       17703 NE 26~ 98052 REDMOND REDMOND
 8 2006-01-04 00:00:00     470000           1               3 NA           R1       17905 NE 26~ 98052 REDMOND REDMOND
 9 2006-01-06 00:00:00     765000           1               3 NA           R1       8944 237TH ~ 98053 NA      REDMOND
10 2006-01-06 00:00:00     589950           1               3 NA           R1       11922 173RD~ 98052 REDMOND REDMOND
# ... with 5,505 more rows, and 16 more variables: lon <dbl>, lat <dbl>, building_grade <dbl>,
#   square_feet_total_living <dbl>, bedrooms <dbl>, bath_full_count <dbl>, bath_half_count <dbl>, bath_3qtr_count <dbl>,
#   year_built <dbl>, year_renovated <dbl>, current_zoning <chr>, sq_ft_lot <dbl>, prop_type <chr>, present_use <dbl>,
#   sales_price_per_sqft <dbl>, sale_year <chr>
```

#Filer all houses whose sale price < 500000 using filter() function

housing_df %>% filter(Sale_Price<500000)

```
> #Filer all houses whose sale price < 500000 using filter() function
> housing_df %>% filter(Sale_Price<500000)
# A tibble: 4,040 x 26
   Sale_Date           Sale_Price sale_reason sale_instrument sale_warning sitetype addr_full     zip5 ctyname postalctyn
   <dttm>                   <dbl>       <dbl>           <dbl> <chr>        <chr>    <chr>        <dbl> <chr>   <chr>
 1 2006-01-03 00:00:00     420000           1               3 NA           R1       3303 178TH ~ 98052 REDMOND REDMOND
 2 2006-01-03 00:00:00     369900           1               3 15           R1       16126 NE 10~ 98052 REDMOND REDMOND
 3 2006-01-03 00:00:00     184667           1              15 18 51        R1       8101 229TH ~ 98053 NA      REDMOND
 4 2006-01-04 00:00:00     470000           1               3 NA           R1       17905 NE 26~ 98052 REDMOND REDMOND
 5 2006-01-04 00:00:00     165000           1               3 NA           R1       2921 288TH ~ 98053 NA      REDMOND
 6 2006-01-09 00:00:00     372500           1               3 NA           R1       26920 NE 50~ 98053 NA      REDMOND
 7 2006-01-10 00:00:00     482000           1               3 NA           R1       9166 226TH ~ 98053 NA      REDMOND
 8 2006-01-11 00:00:00     372500           1               3 NA           R2       8606 134TH ~ 98052 REDMOND REDMOND
 9 2006-01-11 00:00:00     265000           1               3 NA           R1       25149 NE PA~ 98053 NA      REDMOND
10 2006-01-12 00:00:00     470000           1               3 NA           R1       14876 NE 78~ 98052 REDMOND REDMOND
# ... with 4,030 more rows, and 16 more variables: lon <dbl>, lat <dbl>, building_grade <dbl>,
#   square_feet_total_living <dbl>, bedrooms <dbl>, bath_full_count <dbl>, bath_half_count <dbl>, bath_3qtr_count <dbl>,
#   year_built <dbl>, year_renovated <dbl>, current_zoning <chr>, sq_ft_lot <dbl>, prop_type <chr>, present_use <dbl>,
#   sales_price_per_sqft <dbl>, sale_year <chr>
>
```

#Filer all houses which are sold in 2006 and sale price is less than 500000 using filter() function

housing_df %>% filter(Sale_Price<500000& sale_year=='2006')

```
> #Filer all houses which are sold in 2006 and sale price is less than 500000 using filter() function
> housing_df %>% filter(Sale_Price<500000& sale_year=='2006')
# A tibble: 524 x 26
   Sale_Date           Sale_Price sale_reason sale_instrument sale_warning sitetype addr_full     zip5 ctyname postalctyn
   <dttm>                   <dbl>       <dbl>           <dbl> <chr>        <chr>    <chr>        <dbl> <chr>   <chr>
 1 2006-01-03 00:00:00     420000           1               3 NA           R1       3303 178TH ~ 98052 REDMOND REDMOND
 2 2006-01-03 00:00:00     369900           1               3 15           R1       16126 NE 10~ 98052 REDMOND REDMOND
 3 2006-01-03 00:00:00     184667           1              15 18 51        R1       8101 229TH ~ 98053 NA      REDMOND
 4 2006-01-04 00:00:00     470000           1               3 NA           R1       17905 NE 26~ 98052 REDMOND REDMOND
 5 2006-01-04 00:00:00     165000           1               3 NA           R1       2921 288TH ~ 98053 NA      REDMOND
 6 2006-01-09 00:00:00     372500           1               3 NA           R1       26920 NE 50~ 98053 NA      REDMOND
 7 2006-01-10 00:00:00     482000           1               3 NA           R1       9166 226TH ~ 98053 NA      REDMOND
 8 2006-01-11 00:00:00     372500           1               3 NA           R2       8606 134TH ~ 98052 REDMOND REDMOND
 9 2006-01-11 00:00:00     265000           1               3 NA           R1       25149 NE PA~ 98053 NA      REDMOND
10 2006-01-12 00:00:00     470000           1               3 NA           R1       14876 NE 78~ 98052 REDMOND REDMOND
# ... with 514 more rows, and 16 more variables: lon <dbl>, lat <dbl>, building_grade <dbl>,
#   square_feet_total_living <dbl>, bedrooms <dbl>, bath_full_count <dbl>, bath_half_count <dbl>, bath_3qtr_count <dbl>,
#   year_built <dbl>, year_renovated <dbl>, current_zoning <chr>, sq_ft_lot <dbl>, prop_type <chr>, present_use <dbl>,
#   sales_price_per_sqft <dbl>, sale_year <chr>
>
```

#Select Sale_Date, sale_price and zip from the dataset using select() function

housing_df %>% select(Sale_Date,Sale_Price,zip5)

```
> #Select Sale_Date, sale_price and zip from the dataset using select() function
> housing_df %>% select(Sale_Date,Sale_Price,zip5)
# A tibble: 12,865 x 3
   Sale_Date           Sale_Price  zip5
   <dttm>                   <dbl> <dbl>
 1 2006-01-03 00:00:00     698000 98052
 2 2006-01-03 00:00:00     649990 98052
 3 2006-01-03 00:00:00     572500 98052
 4 2006-01-03 00:00:00     420000 98052
 5 2006-01-03 00:00:00     369900 98052
 6 2006-01-03 00:00:00     184667 98053
 7 2006-01-04 00:00:00    1050000 98053
 8 2006-01-04 00:00:00     875000 98053
 9 2006-01-04 00:00:00     660000 98053
10 2006-01-04 00:00:00     650000 98052
# ... with 12,855 more rows
>
```

#Select Sale_Date, sale_price and zip from the dataset for 11-bedroom house using filter() and select() function

housing_df %>% filter(bedrooms==11)%>% select(Sale_Date,Sale_Price,zip5)

```
> #Select Sale_Date, sale_price and zip from the dataset for 11-bedroom house using filter() and select() function
> housing_df %>% filter(bedrooms==11)%>% select(Sale_Date,Sale_Price,zip5)
# A tibble: 1 x 3
  Sale_Date           Sale_Price  zip5
  <dttm>                   <dbl> <dbl>
1 2007-12-11 00:00:00    1825000 98052
> 
```

#Arrange the dataset based on sales price from high to low

housing_df %>% arrange(desc(Sale_Price))

```
> #Arrange the dataset based on sales price from high to low
> housing_df %>% arrange(desc(Sale_Price))
# A tibble: 12,865 x 26
   Sale_Date           Sale_Price sale_reason sale_instrument sale_warning sitetype addr_full      zip5 ctyname postalctyn
   <dttm>                   <dbl>       <dbl>           <dbl> <chr>        <chr>    <chr>         <dbl> <chr>   <chr>     
 1 2010-03-02 00:00:00    4400000           1               3 35 45        R1       12025 154TH~ 98052 [illegible] REDMOND  
 2 2010-03-02 00:00:00    4400000           1               3 35 45        R1       12051 154TH~ 98052 [illegible] REDMOND  
 3 2011-11-17 00:00:00    4380542           1              22 11 45        R1       17137 NE 12~ 98052 REDMOND REDMOND
 4 2011-11-17 00:00:00    4380542           1              22 11 45        R1       11818 171ST~ 98052 REDMOND REDMOND
 5 2011-11-17 00:00:00    4380542           1              22 11 45        R1       17011 NE 11~ 98052 REDMOND REDMOND
 6 2011-11-17 00:00:00    4380542           1              22 11 45        R1       16943 NE 11~ 98052 REDMOND REDMOND
 7 2011-11-17 00:00:00    4380542           1              22 11 45        R1       16944 NE 11~ 98052 REDMOND REDMOND
 8 2011-11-17 00:00:00    4380542           1              22 11 45        R1       16909 NE 12~ 98052 REDMOND REDMOND
 9 2011-11-17 00:00:00    4380542           1              22 11 45        R1       17128 NE 12~ 98052 REDMOND REDMOND
10 2011-11-17 00:00:00    4380542           1              22 11 45        R1       17136 NE 12~ 98052 REDMOND REDMOND
# ... with 12,855 more rows, and 16 more variables: lon <dbl>, lat <dbl>, building_grade <dbl>,
#   square_feet_total_living <dbl>, bedrooms <dbl>, bath_full_count <dbl>, bath_half_count <dbl>, bath_3qtr_count <dbl>,
#   year_built <dbl>, year_renovated <dbl>, current_zoning <chr>, sq_ft_lot <dbl>, prop_type <chr>, present_use <dbl>,
#   sales_price_per_sqft <dbl>, sale_year <chr>
> 
```

b.Using the purrr package – perform 2 functions on your dataset.

You could use zip_n, keep, discard, compact, etc.

#Using keep function list all the sales prices which are greater than 2000000

sales_price_gt_2m <-purrr::keep(housing_df$Sale_Price, ~ .x>2000000)

class(sales_price_gt_2m)

str(sales_price_gt_2m)

```
> #Using keep function list all the sales prices which are greater than 2000000
> sales_price_gt_2m <-purrr::keep(housing_df$Sale_Price, ~ .x>2000000)
> 
> class(sales_price_gt_2m)
[1] "numeric"
> str(sales_price_gt_2m)
 num [1:206] 2500000 2169000 2569000 2583000 3000000 ...
> 
```

#Perform map function on the list to generate a list with sales price increased by 5%

sales_price_gt_2m %>% map(function(x) x*.05)

```
> sales_price_gt_2m %>% map(function(x) x*.05)
[[1]]
[1] 125000

[[2]]
[1] 108450

[[3]]
[1] 128450

[[4]]
[1] 129150

[[5]]
[1] 150000

[[6]]
[1] 111750
```

#Using discard function list all the sale year which are greater than 2000

sale_year_gt_2000<-purrr::discard(housing_df$sale_year, ~ .x<2000)

class(sale_year_gt_2000)

str(sale_year_gt_2000)

unique(sale_year_gt_2000)

```
> #Using discard function list all the sale year which are greater than 2000
> sale_year_gt_2000<-purrr::discard(housing_df$sale_year, ~ .x<2000)
> class(sale_year_gt_2000)
[1] "character"
> str(sale_year_gt_2000)
 chr [1:12865] "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" "2006" ...
> unique(sale_year_gt_2000)
 [1] "2006" "2007" "2008" "2009" "2010" "2011" "2012" "2013" "2014" "2015" "2016"
>
```

c.Use the cbind and rbind function on your dataset

#using cbind function add city_indicator

housing_df <-cbind(housing_df,city_indicator=!is.na(housing_df$ctyname))

str(housing_df)

housing_df %>% select(ctyname,city_indicator)

```
> #using cbind function add city_indicator
> housing_df <-cbind(housing_df,city_indicator=!is.na(housing_df$ctyname))
> str(housing_df)
'data.frame':   12865 obs. of  27 variables:
 $ sale_Date               : POSIXct, format: "2006-01-03" "2006-01-03" "2006-01-03" "2006-01-03" ...
 $ sale_Price              : num  698000 649990 572500 420000 369900 ...
 $ sale_reason             : num  1 1 1 1 1 1 1 1 1 1 ...
 $ sale_instrument         : num  3 3 3 3 3 15 3 3 3 3 ...
 $ sale_warning            : chr  NA NA NA NA ...
 $ sitetype                : chr  "R1" "R1" "R1" "R1" ...
 $ addr_full               : chr  "17021 NE 113TH CT" "11927 178TH PL NE" "13315 174TH AVE NE" "3303 178TH AVE NE" ...
 $ zip5                    : num  98052 98052 98052 98052 98052 ...
 $ ctyname                 : chr  "REDMOND" "REDMOND" NA "REDMOND" ...
 $ postalctyn              : chr  "REDMOND" "REDMOND" "REDMOND" "REDMOND" ...
 $ lon                     : num  -122 -122 -122 -122 -122 ...
 $ lat                     : num  47.7 47.7 47.7 47.6 47.7 ...
 $ building_grade          : num  9 9 8 8 7 7 10 10 9 8 ...
 $ square_feet_total_living: num  2810 2880 2770 1620 1440 4160 3960 3720 4160 2760 ...
 $ bedrooms                : num  4 4 4 3 3 4 5 4 4 4 ...
 $ bath_full_count         : num  2 2 1 1 1 2 3 2 2 1 ...
 $ bath_half_count         : num  1 0 1 0 0 1 0 1 1 0 ...
 $ bath_3qtr_count         : num  0 1 1 1 1 1 1 0 1 1 ...
 $ year_built              : num  2003 2006 1987 1968 1980 ...
 $ year_renovated          : num  0 0 0 0 0 0 0 0 0 0 ...
 $ current_zoning          : chr  "R4" "R4" "R6" "R4" ...
 $ sq_ft_lot               : num  6635 5570 8444 9600 7526 ...
 $ prop_type               : chr  "R" "R" "R" "R" ...
 $ present_use             : num  2 2 2 2 2 2 2 2 2 2 ...
 $ sales_price_per_sqft    : num  0.00403 0.00443 0.00484 0.00386 0.00389 ...
 $ sale_year               : chr  "2006" "2006" "2006" "2006" ...
 $ city_indicator          : logi  TRUE TRUE FALSE TRUE TRUE FALSE ...
> housing_df %>% select(ctyname,city_indicator)
      ctyname city_indicator
1     REDMOND           TRUE
2     REDMOND           TRUE
3        <NA>          FALSE
4     REDMOND           TRUE
5     REDMOND           TRUE
6        <NA>          FALSE
7        <NA>          FALSE
8        <NA>          FALSE
9        <NA>          FALSE
10    REDMOND           TRUE
```

#Using rbind function to combine 2 dataframes

hs_sale_yr_bfr_2010<-housing_df %>%filter(sale_year<2010)

head(hs_sale_yr_bfr_2010)

```
> #using rbind function to combine 2 dataframes
> hs_sale_yr_bfr_2010<-housing_df %>%filter(sale_year<2010)
> head(hs_sale_yr_bfr_2010)
  sale_date sale_Price sale_reason sale_instrument sale_warning sitetype          addr_full  zip5 ctyname postalctyn
1 2006-01-03     698000           1               3         <NA>       R1  17021 NE 113TH CT 98052 REDMOND    REDMOND
2 2006-01-03     649990           1               3         <NA>       R1  11927 178TH PL NE 98052 REDMOND    REDMOND
3 2006-01-03     572500           1               3         <NA>       R1 13315 174TH AVE NE 98052    <NA>    REDMOND
4 2006-01-03     420000           1               3         <NA>       R1  3303 178TH AVE NE 98052 REDMOND    REDMOND
5 2006-01-03     369900           1               3           15       R1  16126 NE 108TH CT 98052 REDMOND    REDMOND
6 2006-01-03     184667           1              15        18 51       R1   8101 229TH DR NE 98053    <NA>    REDMOND
       lon      lat building_grade square_feet_total_living bedrooms bath_full_count bath_half_count bath_3qtr_count
1 -122.1124 47.70139             9                      2810        4               2               1              0
2 -122.1022 47.70731             9                      2880        4               2               0              1
3 -122.1085 47.71986             8                      2770        4               1               1              1
4 -122.1037 47.63914             8                      1620        3               1               0              1
5 -122.1242 47.69748             7                      1440        3               1               0              1
6 -122.0341 47.67545             7                      4160        4               2               1              1
  year_built year_renovated current_zoning sq_ft_lot prop_type present_use sales_price_per_sqft sale_year city_indicator
1       2003              0             R4      6635         R           2          0.004025788      2006          TRUE
2       2006              0             R4      5570         R           2          0.004430837      2006          TRUE
3       1987              0             R6      8444         R           2          0.004838428      2006         FALSE
4       1968              0             R4      9600         R           2          0.003857143      2006          TRUE
5       1980              0             R6      7526         R           2          0.003892944      2006          TRUE
6       2005              0          URPSO      7280         R           2          0.022527035      2006         FALSE
>
```

hs_sale_yr_aftr_2010<-housing_df %>%filter(sale_year>=2010)

head(hs_sale_yr_aftr_2010)

```
> hs_sale_yr_aftr_2010<-housing_df %>%filter(sale_year>=2010)
> head(hs_sale_yr_aftr_2010)
  Sale_Date Sale_Price sale_reason sale_instrument sale_warning sitetype          addr_full  zip5 ctyname postalctyn
1 2010-01-04     750000          1               3           26       R1   19736 NE 61ST PL 98053    <NA>    REDMOND
2 2010-01-04     505000          1              22           46       R1  7220 218TH AVE NE 98053    <NA>    REDMOND
3 2010-01-04     155000          1               3           22       R1   9727 163RD PL NE 98052 REDMOND    REDMOND
4 2010-01-05     375000          1               3         <NA>       R1 23670 NE 135TH WAY 98053    <NA>    REDMOND
5 2010-01-06     540000          1               3         <NA>       R1  8220 208TH AVE NE 98053    <NA>    REDMOND
6 2010-01-06     540000         18              22         <NA>       R1   9879 187TH CT NE 98052 REDMOND    REDMOND
       lon      lat building_grade square_feet_total_living bedrooms bath_full_count bath_half_count bath_3qtr_count
1 -122.0757 47.66093             11                    4250        4               2               1               1
2 -122.0481 47.66940              8                    3620        4               2               1               1
3 -122.1231 47.68738              8                    2250        4               1               0               2
4 -122.0223 47.71995              8                    1340        2               2               0               0
5 -122.0608 47.67716              9                    3060        5               1               0               2
6 -122.0909 47.68706              9                    2870        4               2               1               0
  year_built year_renovated current_zoning sq_ft_lot prop_type present_use sales_price_per_sqft sale_year city_indicator
1       2007             0           RA5    223027         R          2          0.005666667      2010          FALSE
2       1987             0           RA5     37163         R          2          0.007168317      2010          FALSE
3       1974             0            R5      8400         R          2          0.014516129      2010           TRUE
4       2006             0         URPSO      4834         R         29          0.003573333      2010          FALSE
5       1962             0           RA5    102847         R          2          0.005666667      2010          FALSE
6       2006             0            R4      5409         R          2          0.005314815      2010           TRUE
>
```

new_housing_df<-rbind(hs_sale_yr_bfr_2010,hs_sale_yr_aftr_2010)

head(new_housing_df)

```
> new_housing_df<-rbind(hs_sale_yr_bfr_2010,hs_sale_yr_aftr_2010)
> head(new_housing_df)
  Sale_Date Sale_Price sale_reason sale_instrument sale_warning sitetype          addr_full  zip5 ctyname postalctyn
1 2006-01-03     698000          1               3         <NA>       R1  17021 NE 113TH CT 98052 REDMOND    REDMOND
2 2006-01-03     649990          1               3         <NA>       R1  11927 178TH PL NE 98052 REDMOND    REDMOND
3 2006-01-03     572500          1               3         <NA>       R1 13315 174TH AVE NE 98052    <NA>    REDMOND
4 2006-01-03     420000          1               3         <NA>       R1  3303 178TH AVE NE 98052 REDMOND    REDMOND
5 2006-01-03     369900          1               3           15       R1  16126 NE 108TH CT 98052 REDMOND    REDMOND
6 2006-01-03     184667          1              15        18 51       R1   8101 229TH DR NE 98053    <NA>    REDMOND
       lon      lat building_grade square_feet_total_living bedrooms bath_full_count bath_half_count bath_3qtr_count
1 -122.1124 47.70139              9                    2810        4               2               1               0
2 -122.1022 47.70731              9                    2880        4               2               0               1
3 -122.1085 47.71986              8                    2770        4               1               1               1
4 -122.1037 47.63914              8                    1620        3               1               0               1
5 -122.1242 47.69748              7                    1440        3               1               0               1
6 -122.0341 47.67545              7                    4160        4               2               1               1
  year_built year_renovated current_zoning sq_ft_lot prop_type present_use sales_price_per_sqft sale_year city_indicator
1       2003             0            R4      6635         R          2          0.004025788      2006           TRUE
2       2006             0            R4      5570         R          2          0.004430837      2006           TRUE
3       1987             0            R6      8444         R          2          0.004838428      2006          FALSE
4       1968             0            R4      9600         R          2          0.003857143      2006           TRUE
5       1980             0            R6      7526         R          2          0.003892944      2006           TRUE
6       2005             0         URPSO      7280         R          2          0.022527035      2006          FALSE
>
```

identical(new_housing_df,housing_df)

```
> identical(new_housing_df,housing_df)
[1] TRUE
>
```

d.Split a string, then concatenate the results back together

Load the stringr package

library(stringr)

#split the Sale_Date columns

sales_date_list<-str_split(string=housing_df$Sale_Date,pattern = '-')

head(sales_date_list)

```
> #split the Sale_Date columns
> sales_date_list<-str_split(string=housing_df$Sale_Date,pattern = '-')
> head(sales_date_list)
[[1]]
[1] "2006" "01"   "03"

[[2]]
[1] "2006" "01"   "03"

[[3]]
[1] "2006" "01"   "03"

[[4]]
[1] "2006" "01"   "03"

[[5]]
[1] "2006" "01"   "03"

[[6]]
[1] "2006" "01"   "03"
```

#Create dataframe from the list

sales_date_matrix=data.frame(Reduce(rbind,sales_date_list))

head(sales_date_matrix)

```
> #Create dataframe from the list
> sales_date_matrix=data.frame(Reduce(rbind,sales_date_list))
> head(sales_date_matrix)
       X1 X2 X3
init 2006 01 03
X    2006 01 03
X.1  2006 01 03
X.2  2006 01 03
X.3  2006 01 03
X.4  2006 01 03
>
```

#assign names to the new columns

names(sales_date_matrix)<- c('sale_year','sale_month','sale_date')

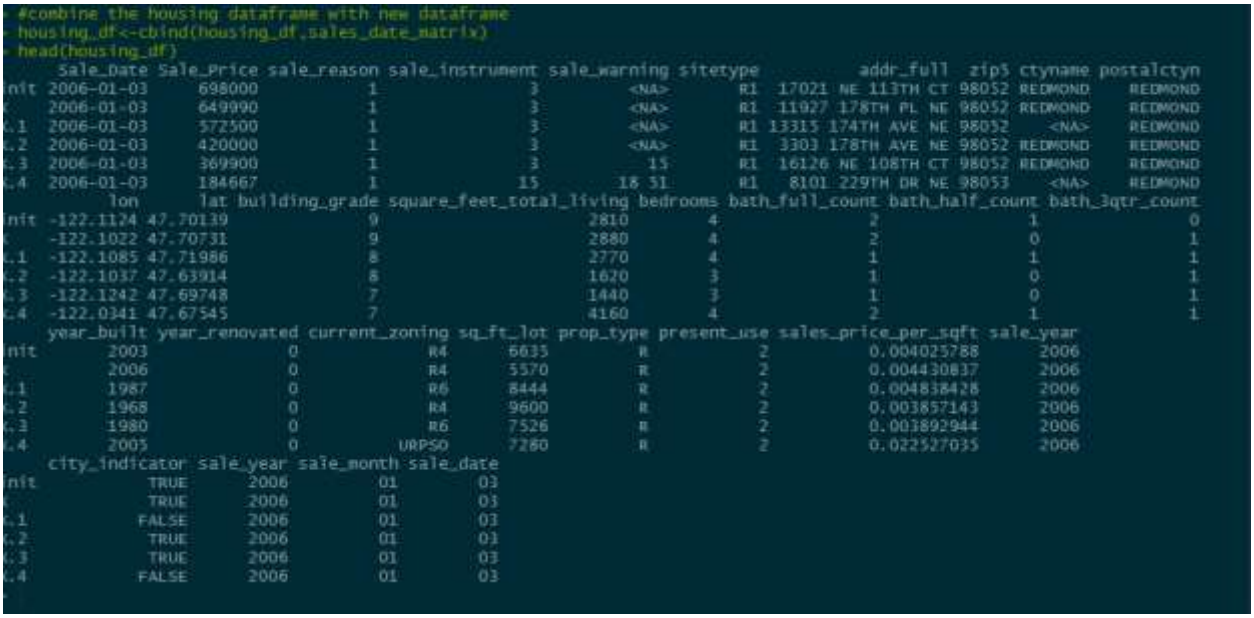
head(sales_date_matrix)

```
> #assign names to the new columns
> names(sales_date_matrix)<- c('sale_year','sale_month','sale_date')
> head(sales_date_matrix)
     sale_year sale_month sale_date
init      2006         01        03
X         2006         01        03
X.1       2006         01        03
X.2       2006         01        03
X.3       2006         01        03
X.4       2006         01        03
>
```

#combine the housing dataframe with new dataframe

housing_df<-cbind(housing_df,sales_date_matrix)

head(housing_df)



```
> #combine the housing dataframe with new dataframe
> housing_df<-cbind(housing_df,sales_date_matrix)
> head(housing_df)
     Sale_Date Sale_Price sale_reason sale_instrument sale_warning sitetype          addr_full  zip5 ctyname postalctyn
init 2006-01-03     698000           1               3         <NA>       R1  17021 NE 113TH CT 98052 REDMOND    REDMOND
     2006-01-03     649990           1               3         <NA>       R1  11927 178TH PL NE 98052 REDMOND    REDMOND
1.1  2006-01-03     572500           1               3         <NA>       R1 13315 174TH AVE NE 98052    <NA>    REDMOND
1.2  2006-01-03     420000           1               3         <NA>       R1  3303 178TH AVE NE 98052 REDMOND    REDMOND
1.3  2006-01-03     369900           1               3           15       R1  16126 NE 108TH CT 98052 REDMOND    REDMOND
1.4  2006-01-03     184667           1              15        18 51       R1   8101 229TH DR NE 98053    <NA>    REDMOND
         lon      lat building_grade square_feet_total_living bedrooms bath_full_count bath_half_count bath_3qtr_count
init -122.1124 47.70139             9                    2810        4               2               1              0
     -122.1022 47.70731             9                    2880        4               2               0              1
1.1  -122.1085 47.71986             8                    2770        4               1               1              1
1.2  -122.1037 47.63914             8                    1620        3               1               0              1
1.3  -122.1242 47.69748             7                    1440        3               1               0              1
1.4  -122.0341 47.67545             7                    4160        4               2               1              1
     year_built year_renovated current_zoning sq_ft_lot prop_type present_use sales_price_per_sqft sale_year
init       2003              0             R4      6635         R           2          0.004025788      2006
           2006              0             R4      5570         R           2          0.004430837      2006
1.1        1987              0             R6      8444         R           2          0.004838428      2006
1.2        1968              0             R4      9600         R           2          0.003857143      2006
1.3        1980              0             R6      7526         R           2          0.003892944      2006
1.4        2005              0          URPSO      7280         R           2          0.022527035      2006
     city_indicator sale_year sale_month sale_date
init           TRUE      2006         01        03
               TRUE      2006         01        03
1.1           FALSE      2006         01        03
1.2            TRUE      2006         01        03
1.3            TRUE      2006         01        03
1.4           FALSE      2006         01        03
```