Course Project

# Predictive Analytics Course Project Phase 1

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### Assignment Needs & Data Importation

Libraries & dataset needed for Assignemnt

options(tidyverse.quiet = TRUE)  
library(tidyverse)  
library(dplyr)  
library(caret)

## Warning: package 'caret' was built under R version 3.5.2

## Loading required package: lattice

##   
## Attaching package: 'caret'

## The following object is masked from 'package:purrr':  
##   
## lift

library(mice) #package for imputation

## Warning: package 'mice' was built under R version 3.5.2

##   
## Attaching package: 'mice'

## The following object is masked from 'package:tidyr':  
##   
## complete

## The following objects are masked from 'package:base':  
##   
## cbind, rbind

library(VIM) #visualizing missingness

## Warning: package 'VIM' was built under R version 3.5.2

## Loading required package: colorspace

## Loading required package: grid

## Loading required package: data.table

## Warning: package 'data.table' was built under R version 3.5.2

##   
## Attaching package: 'data.table'

## The following objects are masked from 'package:dplyr':  
##   
## between, first, last

## The following object is masked from 'package:purrr':  
##   
## transpose

## VIM is ready to use.   
## Since version 4.0.0 the GUI is in its own package VIMGUI.  
##   
## Please use the package to use the new (and old) GUI.

## Suggestions and bug-reports can be submitted at: https://github.com/alexkowa/VIM/issues

##   
## Attaching package: 'VIM'

## The following object is masked from 'package:datasets':  
##   
## sleep

library(GGally)

## Warning: package 'GGally' was built under R version 3.5.2

##   
## Attaching package: 'GGally'

## The following object is masked from 'package:dplyr':  
##   
## nasa

library(MASS) #Conflicts with dplyr remember to use dplyr::for select commands

## Warning: package 'MASS' was built under R version 3.5.2

##   
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':  
##   
## select

library(leaps)

## Warning: package 'leaps' was built under R version 3.5.2

rain <- read\_csv("rain.csv")

## Parsed with column specification:  
## cols(  
## .default = col\_double(),  
## Date = col\_character(),  
## WindGustDir = col\_character(),  
## WindDir9am = col\_character(),  
## WindDir3pm = col\_character(),  
## RainToday = col\_character(),  
## RainTomorrow = col\_character()  
## )

## See spec(...) for full column specifications.

str(rain)

## Classes 'tbl\_df', 'tbl' and 'data.frame': 28003 obs. of 20 variables:  
## $ Date : chr "12/5/2008" "12/6/2008" "12/16/2008" "12/17/2008" ...  
## $ MinTemp : num 17.5 14.6 9.8 14.1 20.5 20.1 9.6 14 12.5 17.4 ...  
## $ MaxTemp : num 32.3 29.7 27.7 20.9 31.8 32.7 23.9 28.3 28.4 43 ...  
## $ Rainfall : num 1 0.2 NA 0 0 0 0 0 0 0 ...  
## $ WindGustDir : chr "W" "WNW" "WNW" "ENE" ...  
## $ WindGustSpeed: int 41 56 50 22 41 48 41 48 37 39 ...  
## $ WindDir9am : chr "ENE" "W" NA "SSW" ...  
## $ WindDir3pm : chr "NW" "W" "WNW" "E" ...  
## $ WindSpeed9am : int 7 19 NA 11 19 13 19 17 20 7 ...  
## $ WindSpeed3pm : int 20 24 22 9 20 30 11 24 9 17 ...  
## $ Humidity9am : int 82 55 50 69 54 56 44 43 38 40 ...  
## $ Humidity3pm : int 33 23 28 82 24 15 22 15 16 8 ...  
## $ Pressure9am : num 1011 1009 1013 1012 1008 ...  
## $ Pressure3pm : num 1006 1005 1010 1010 1006 ...  
## $ Cloud9am : int 7 NA 0 8 NA NA NA NA NA NA ...  
## $ Cloud3pm : int 8 NA NA 1 NA NA NA NA NA NA ...  
## $ Temp9am : num 17.8 20.6 17.3 17.2 23.8 24.6 14.9 17.9 17.2 25.6 ...  
## $ Temp3pm : num 29.7 28.9 26.2 18.1 30.8 32.1 22.1 27.6 26.6 41.5 ...  
## $ RainToday : chr "No" "No" NA "No" ...  
## $ RainTomorrow : chr "No" "No" "No" "Yes" ...  
## - attr(\*, "spec")=List of 2  
## ..$ cols :List of 20  
## .. ..$ Date : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_character" "collector"  
## .. ..$ MinTemp : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ MaxTemp : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ Rainfall : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ WindGustDir : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_character" "collector"  
## .. ..$ WindGustSpeed: list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ WindDir9am : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_character" "collector"  
## .. ..$ WindDir3pm : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_character" "collector"  
## .. ..$ WindSpeed9am : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ WindSpeed3pm : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ Humidity9am : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ Humidity3pm : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ Pressure9am : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ Pressure3pm : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ Cloud9am : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ Cloud3pm : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_integer" "collector"  
## .. ..$ Temp9am : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ Temp3pm : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_double" "collector"  
## .. ..$ RainToday : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_character" "collector"  
## .. ..$ RainTomorrow : list()  
## .. .. ..- attr(\*, "class")= chr "collector\_character" "collector"  
## ..$ default: list()  
## .. ..- attr(\*, "class")= chr "collector\_guess" "collector"  
## ..- attr(\*, "class")= chr "col\_spec"

Factor conversion and recoding

rain = rain%>% mutate(Date =as\_factor(as.character(Date)))  
  
  
rain = rain%>% mutate(RainToday =as\_factor(as.character(RainToday)))%>% mutate(RainToday =fct\_recode(RainToday,"No" = "0","Yes" = "1"))

## Warning: Unknown levels in `f`: 0, 1

rain = rain%>% mutate(RainTomorrow =as\_factor(as.character(RainTomorrow)))%>% mutate(RainTomorrow =fct\_recode(RainTomorrow,"No" = "0","Yes" = "1"))

## Warning: Unknown levels in `f`: 0, 1

rain = rain %>% mutate(WindGustDir = as\_factor(WindGustDir)) %>%  
mutate(WindGustDir = fct\_recode(WindGustDir,  
"E" = "1",  
"W" = "2",  
"N" = "3",  
"S" = "4",  
"NE" = "5",  
"NW" = "6",  
"SE" = "7",  
"SW" = "8",  
"ENE" = "9",  
"ESE" = "10",  
"WNW" = "11",  
"WSW" = "12",  
"SSE" = "13",  
"SSW" = "14",  
"NNE" = "15",  
"NNW" = "16"  
))

## Warning: Unknown levels in `f`: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,  
## 14, 15, 16

rain = rain %>% mutate(WindDir9am = as\_factor(WindDir9am)) %>%  
mutate(WindDir9am = fct\_recode(WindDir9am,  
"E" = "1",  
"W" = "2",  
"N" = "3",  
"S" = "4",  
"NE" = "5",  
"NW" = "6",  
"SE" = "7",  
"SW" = "8",  
"ENE" = "9",  
"ESE" = "10",  
"WNW" = "11",  
"WSW" = "12",  
"SSE" = "13",  
"SSW" = "14",  
"NNE" = "15",  
"NNW" = "16"  
))

## Warning: Unknown levels in `f`: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,  
## 14, 15, 16

rain = rain %>% mutate(WindDir3pm = as\_factor(WindDir3pm)) %>%  
mutate(WindDir3pm = fct\_recode(WindDir3pm,  
"E" = "1",  
"W" = "2",  
"N" = "3",  
"S" = "4",  
"NE" = "5",  
"NW" = "6",  
"SE" = "7",  
"SW" = "8",  
"ENE" = "9",  
"ESE" = "10",  
"WNW" = "11",  
"WSW" = "12",  
"SSE" = "13",  
"SSW" = "14",  
"NNE" = "15",  
"NNW" = "16"  
))

## Warning: Unknown levels in `f`: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,  
## 14, 15, 16

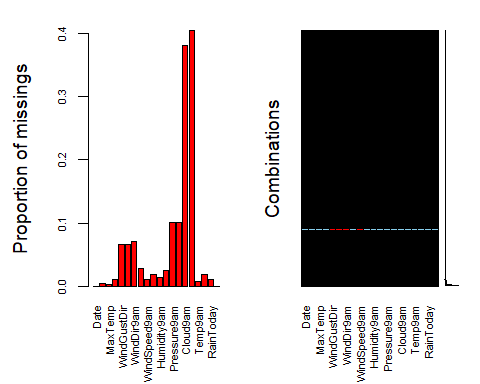
str(rain)

## Classes 'tbl\_df', 'tbl' and 'data.frame': 28003 obs. of 20 variables:  
## $ Date : Factor w/ 3223 levels "12/5/2008","12/6/2008",..: 1 2 3 4 5 6 7 8 9 10 ...  
## $ MinTemp : num 17.5 14.6 9.8 14.1 20.5 20.1 9.6 14 12.5 17.4 ...  
## $ MaxTemp : num 32.3 29.7 27.7 20.9 31.8 32.7 23.9 28.3 28.4 43 ...  
## $ Rainfall : num 1 0.2 NA 0 0 0 0 0 0 0 ...  
## $ WindGustDir : Factor w/ 16 levels "W","WNW","ENE",..: 1 2 2 3 2 2 1 1 4 5 ...  
## $ WindGustSpeed: num 41 56 50 22 41 48 41 48 37 39 ...  
## $ WindDir9am : Factor w/ 16 levels "ENE","W","SSW",..: 1 2 NA 3 2 4 5 2 6 6 ...  
## $ WindDir3pm : Factor w/ 16 levels "NW","W","WNW",..: 1 2 3 4 2 3 5 6 7 5 ...  
## $ WindSpeed9am : num 7 19 NA 11 19 13 19 17 20 7 ...  
## $ WindSpeed3pm : num 20 24 22 9 20 30 11 24 9 17 ...  
## $ Humidity9am : num 82 55 50 69 54 56 44 43 38 40 ...  
## $ Humidity3pm : num 33 23 28 82 24 15 22 15 16 8 ...  
## $ Pressure9am : num 1011 1009 1013 1012 1008 ...  
## $ Pressure3pm : num 1006 1005 1010 1010 1006 ...  
## $ Cloud9am : num 7 NA 0 8 NA NA NA NA NA NA ...  
## $ Cloud3pm : num 8 NA NA 1 NA NA NA NA NA NA ...  
## $ Temp9am : num 17.8 20.6 17.3 17.2 23.8 24.6 14.9 17.9 17.2 25.6 ...  
## $ Temp3pm : num 29.7 28.9 26.2 18.1 30.8 32.1 22.1 27.6 26.6 41.5 ...  
## $ RainToday : Factor w/ 2 levels "No","Yes": 1 1 NA 1 1 1 1 1 1 1 ...  
## $ RainTomorrow : Factor w/ 2 levels "No","Yes": 1 1 1 2 1 1 1 1 1 1 ...

### Testing for Missing Data

#is.na(rain) Finds all missing data in the dataset, commented out for knitting   
vim\_plot = aggr(rain, numbers = TRUE, prop = c(TRUE, FALSE),cex.axis=.7) #Plots missing data

## Warning in plot.aggr(res, ...): not enough vertical space to display  
## frequencies (too many combinations)

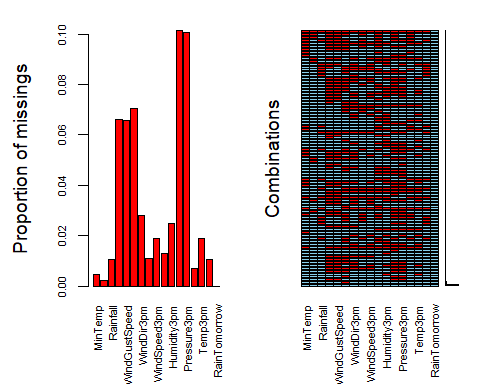


We have several rows of missing data in this dataset. To have the most accurate data we will need to remove this missing data. Reviewing the vim\_plot we can see the columns for Cloud Coverage at 9 am and 3pm are missing loads of data. As such, I will begin by using Column-wise deletion to remove these two columns as well as date as it is not needed.

Column-wise deletion & removing missing data

rain = dplyr::select(rain, -Date, -Cloud9am, -Cloud3pm) #creates new dataset without these two cols  
vim\_plot2 = aggr(rain, numbers = TRUE, prop = c(TRUE, FALSE),cex.axis=.7) #Plots missing data

## Warning in plot.aggr(res, ...): not enough vertical space to display  
## frequencies (too many combinations)



Aggregating data to have Average variables

rain2<-rain %>% mutate(AvgHumidity = rowMeans(rain[c('Humidity9am', 'Humidity3pm')], na.rm=FALSE))%>% mutate(AvgPressure = rowMeans(rain[c('Pressure9am', 'Pressure3pm')], na.rm=FALSE))%>% mutate(AvgWindSpeed = rowMeans(rain[c('WindSpeed9am', 'WindSpeed3pm')], na.rm=FALSE))%>% mutate(AvgTemp = rowMeans(rain[c('Temp9am', 'Temp3pm')], na.rm=FALSE))  
  
  
#select only variables relevant to our analysis for final set  
rain3<-dplyr::select(rain2, RainTomorrow, RainToday, Rainfall, MaxTemp, MinTemp, WindGustDir, WindGustSpeed, AvgHumidity,AvgPressure,AvgWindSpeed,AvgTemp)

Next we will use the “mice” package to do imputation on the rest of the missing data.

imp\_rain = mice(rain3, m=1, method='pmm', printFlag=FALSE)  
summary(imp\_rain)

## Class: mids  
## Number of multiple imputations: 1   
## Imputation methods:  
## RainTomorrow RainToday Rainfall MaxTemp MinTemp   
## "" "pmm" "pmm" "pmm" "pmm"   
## WindGustDir WindGustSpeed AvgHumidity AvgPressure AvgWindSpeed   
## "pmm" "pmm" "pmm" "pmm" "pmm"   
## AvgTemp   
## "pmm"   
## PredictorMatrix:  
## RainTomorrow RainToday Rainfall MaxTemp MinTemp WindGustDir  
## RainTomorrow 0 1 1 1 1 1  
## RainToday 1 0 1 1 1 1  
## Rainfall 1 1 0 1 1 1  
## MaxTemp 1 1 1 0 1 1  
## MinTemp 1 1 1 1 0 1  
## WindGustDir 1 1 1 1 1 0  
## WindGustSpeed AvgHumidity AvgPressure AvgWindSpeed AvgTemp  
## RainTomorrow 1 1 1 1 1  
## RainToday 1 1 1 1 1  
## Rainfall 1 1 1 1 1  
## MaxTemp 1 1 1 1 1  
## MinTemp 1 1 1 1 1  
## WindGustDir 1 1 1 1 1

Merge the imputed values into our rain\_complete data frame

rain\_complete = complete(imp\_rain)   
summary(rain\_complete)

## RainTomorrow RainToday Rainfall MaxTemp   
## No :21713 No :21730 Min. : 0.000 Min. :-3.00   
## Yes: 6290 Yes: 6273 1st Qu.: 0.000 1st Qu.:17.90   
## Median : 0.000 Median :22.60   
## Mean : 2.284 Mean :23.18   
## 3rd Qu.: 0.800 3rd Qu.:28.20   
## Max. :268.600 Max. :47.00   
##   
## MinTemp WindGustDir WindGustSpeed AvgHumidity   
## Min. :-8.50 W : 2036 Min. : 7.00 Min. : 1.00   
## 1st Qu.: 7.60 SE : 2003 1st Qu.: 30.00 1st Qu.: 48.50   
## Median :12.00 E : 1950 Median : 39.00 Median : 61.50   
## Mean :12.16 S : 1919 Mean : 39.83 Mean : 60.19   
## 3rd Qu.:16.80 SSE : 1912 3rd Qu.: 48.00 3rd Qu.: 73.50   
## Max. :30.50 N : 1884 Max. :135.00 Max. :100.00   
## (Other):16299   
## AvgPressure AvgWindSpeed AvgTemp   
## Min. : 979.8 Min. : 0.0 Min. :-4.45   
## 1st Qu.:1011.9 1st Qu.:11.0 1st Qu.:14.50   
## Median :1016.6 Median :15.5 Median :18.95   
## Mean :1016.7 Mean :16.3 Mean :19.30   
## 3rd Qu.:1021.4 3rd Qu.:20.5 3rd Qu.:23.85   
## Max. :1039.0 Max. :80.5 Max. :40.90   
##

vim\_plot3 = aggr(rain\_complete, numbers = TRUE, prop = c(TRUE, FALSE),cex.axis=.7)# Plots missing data .

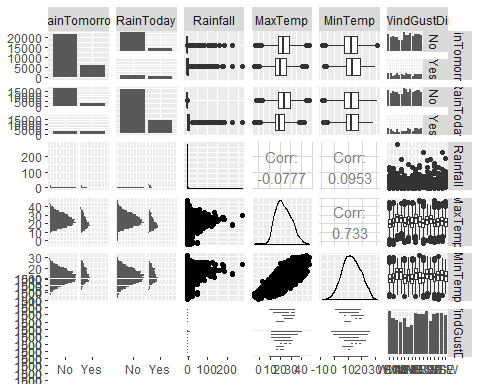
## Warning in plot.aggr(res, ...): not enough horizontal space to display  
## frequencies

### 

### Looking for important variables

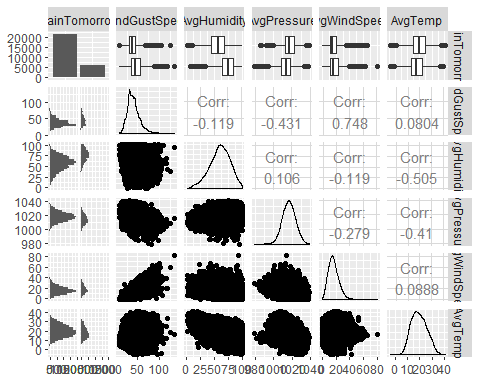
ggpairs(rain\_complete, columns = c(1:6), cardinality\_threshold = 20) #MinTemp to Wind Gust

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



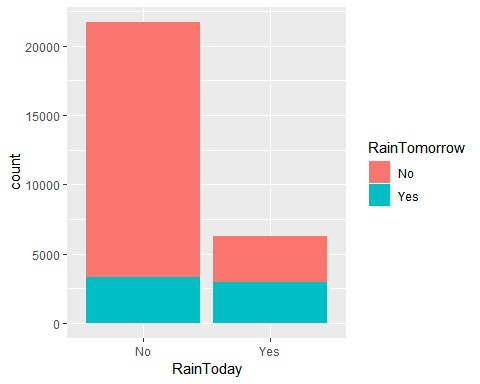
ggpairs(rain\_complete, columns = c(1, 7:11), cardinality\_threshold = 20) #

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.  
## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



### Graphing the Variables in relation to response variable

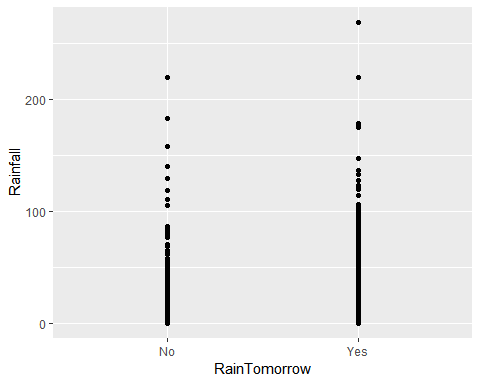
#Looking at the relationship of RainTomorrow to RainToday  
ggplot(rain\_complete, aes(x=RainToday, fill = RainTomorrow)) + geom\_bar()



#table view  
tb = table(rain\_complete$RainTomorrow, rain\_complete$RainToday) #creates table object  
prop.table(tb, margin = 2) #crosstab with proportions

##   
## No Yes  
## No 0.8470778 0.5270206  
## Yes 0.1529222 0.4729794

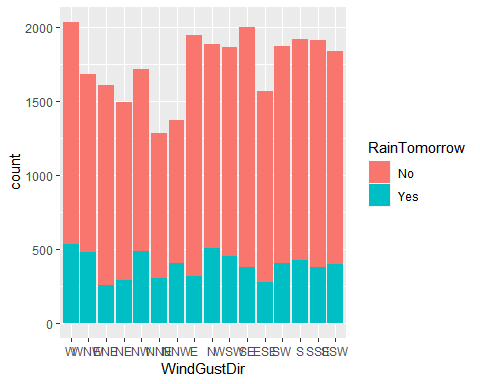
#Looking at the relationship of RainTomorrow to RainFall \*\*  
ggplot(rain\_complete, aes(y=Rainfall, x= RainTomorrow)) + geom\_point()



#table view  
tb1 = table(rain\_complete$RainTomorrow, rain\_complete$Rainfall) #creates table object   
prop.table(tb1, margin = 2) #crosstab with proportions

##   
## 0 0.1 0.2 0.3 0.4 0.5  
## No 0.8688935 0.8717949 0.7871581 0.7894737 0.7089136 0.5000000  
## Yes 0.1311065 0.1282051 0.2128419 0.2105263 0.2910864 0.5000000  
##   
## 0.6 0.8 0.9 1 1.2 1.4  
## No 0.7049808 0.6825776 0.7500000 0.7042683 0.6285714 0.6230769  
## Yes 0.2950192 0.3174224 0.2500000 0.2957317 0.3714286 0.3769231  
##   
## 1.6 1.7 1.8 1.9 2 2.1  
## No 0.6666667 0.0000000 0.7033493 0.5000000 0.6598985 1.0000000  
## Yes 0.3333333 1.0000000 0.2966507 0.5000000 0.3401015 0.0000000  
##   
## 2.2 2.3 2.4 2.5 2.6 2.8  
## No 0.6615385 0.0000000 0.5955056 0.5000000 0.6120219 0.6223776  
## Yes 0.3384615 1.0000000 0.4044944 0.5000000 0.3879781 0.3776224  
##   
## 2.9 3 3.1 3.2 3.3 3.4  
## No 1.0000000 0.6170213 1.0000000 0.5801527 1.0000000 0.5000000  
## Yes 0.0000000 0.3829787 0.0000000 0.4198473 0.0000000 0.5000000  
##   
## 3.6 3.8 3.9 4 4.1 4.2  
## No 0.6261682 0.6000000 1.0000000 0.5508475 1.0000000 0.5185185  
## Yes 0.3738318 0.4000000 0.0000000 0.4491525 0.0000000 0.4814815  
##   
## 4.4 4.5 4.6 4.7 4.8 4.9  
## No 0.5106383 1.0000000 0.6315789 1.0000000 0.5441176 1.0000000  
## Yes 0.4893617 0.0000000 0.3684211 0.0000000 0.4558824 0.0000000  
##   
## 5 5.2 5.4 5.6 5.8 6  
## No 0.5154639 0.5000000 0.6056338 0.5072464 0.5441176 0.4805195  
## Yes 0.4845361 0.5000000 0.3943662 0.4927536 0.4558824 0.5194805  
##   
## 6.2 6.4 6.5 6.6 6.8 7  
## No 0.5189873 0.5000000 0.5000000 0.5517241 0.4464286 0.4464286  
## Yes 0.4810127 0.5000000 0.5000000 0.4482759 0.5535714 0.5535714  
##   
## 7.2 7.4 7.5 7.6 7.8 8  
## No 0.5000000 0.5769231 1.0000000 0.5098039 0.4222222 0.4833333  
## Yes 0.5000000 0.4230769 0.0000000 0.4901961 0.5777778 0.5166667  
##   
## 8.2 8.4 8.5 8.6 8.7 8.8  
## No 0.5185185 0.5937500 0.5000000 0.5714286 1.0000000 0.5102041  
## Yes 0.4814815 0.4062500 0.5000000 0.4285714 0.0000000 0.4897959  
##   
## 9 9.2 9.4 9.6 9.8 9.9  
## No 0.4750000 0.5925926 0.4358974 0.6750000 0.3500000 0.0000000  
## Yes 0.5250000 0.4074074 0.5641026 0.3250000 0.6500000 1.0000000  
##   
## 10 10.2 10.4 10.6 10.8 10.9  
## No 0.4117647 0.2592593 0.4000000 0.4838710 0.4482759 0.0000000  
## Yes 0.5882353 0.7407407 0.6000000 0.5161290 0.5517241 1.0000000  
##   
## 11 11.2 11.4 11.5 11.6 11.8  
## No 0.3947368 0.5714286 0.3529412 0.0000000 0.3913043 0.2962963  
## Yes 0.6052632 0.4285714 0.6470588 1.0000000 0.6086957 0.7037037  
##   
## 12 12.2 12.4 12.5 12.6 12.8  
## No 0.6111111 0.5416667 0.4545455 0.0000000 0.2777778 0.5200000  
## Yes 0.3888889 0.4583333 0.5454545 1.0000000 0.7222222 0.4800000  
##   
## 13 13.2 13.3 13.4 13.6 13.8  
## No 0.3571429 0.3684211 0.0000000 0.2333333 0.2962963 0.4117647  
## Yes 0.6428571 0.6315789 1.0000000 0.7666667 0.7037037 0.5882353  
##   
## 14 14.2 14.4 14.6 14.8 15  
## No 0.4166667 0.2692308 0.4375000 0.3333333 0.3333333 0.4761905  
## Yes 0.5833333 0.7307692 0.5625000 0.6666667 0.6666667 0.5238095  
##   
## 15.2 15.4 15.5 15.6 15.8 16  
## No 0.3125000 0.3125000 0.0000000 0.4500000 0.5384615 0.2307692  
## Yes 0.6875000 0.6875000 1.0000000 0.5500000 0.4615385 0.7692308  
##   
## 16.2 16.4 16.6 16.8 17 17.2  
## No 0.3529412 0.4210526 0.5000000 0.5294118 0.3636364 0.2307692  
## Yes 0.6470588 0.5789474 0.5000000 0.4705882 0.6363636 0.7692308  
##   
## 17.4 17.5 17.6 17.8 18 18.1  
## No 0.3000000 1.0000000 0.4285714 0.3500000 0.4000000 1.0000000  
## Yes 0.7000000 0.0000000 0.5714286 0.6500000 0.6000000 0.0000000  
##   
## 18.2 18.4 18.6 18.8 19 19.2  
## No 0.6666667 0.4375000 0.6250000 0.4000000 0.6428571 0.6666667  
## Yes 0.3333333 0.5625000 0.3750000 0.6000000 0.3571429 0.3333333  
##   
## 19.4 19.6 19.8 20 20.2 20.4  
## No 0.4444444 0.4285714 0.4545455 0.5384615 0.2666667 0.6666667  
## Yes 0.5555556 0.5714286 0.5454545 0.4615385 0.7333333 0.3333333  
##   
## 20.6 20.7 20.8 21 21.2 21.4  
## No 0.4444444 0.0000000 0.5714286 0.5714286 0.7000000 0.7000000  
## Yes 0.5555556 1.0000000 0.4285714 0.4285714 0.3000000 0.3000000  
##   
## 21.6 21.8 22 22.2 22.4 22.6  
## No 0.8750000 0.2000000 0.1666667 0.0000000 0.5833333 0.4285714  
## Yes 0.1250000 0.8000000 0.8333333 1.0000000 0.4166667 0.5714286  
##   
## 22.8 23 23.2 23.4 23.6 23.8  
## No 0.4000000 1.0000000 0.2222222 0.0000000 0.7000000 0.5000000  
## Yes 0.6000000 0.0000000 0.7777778 1.0000000 0.3000000 0.5000000  
##   
## 24 24.2 24.4 24.6 24.8 25  
## No 0.2857143 0.2500000 0.1428571 0.1250000 0.5000000 0.2000000  
## Yes 0.7142857 0.7500000 0.8571429 0.8750000 0.5000000 0.8000000  
##   
## 25.2 25.4 25.6 25.8 26 26.2  
## No 0.1666667 0.2500000 0.5000000 0.6666667 0.3333333 0.7777778  
## Yes 0.8333333 0.7500000 0.5000000 0.3333333 0.6666667 0.2222222  
##   
## 26.4 26.5 26.6 26.8 27 27.2  
## No 0.5000000 0.0000000 0.2500000 0.2500000 0.6666667 0.1818182  
## Yes 0.5000000 1.0000000 0.7500000 0.7500000 0.3333333 0.8181818  
##   
## 27.4 27.6 27.8 28 28.2 28.4  
## No 0.5714286 0.3333333 0.5000000 0.3333333 0.0000000 1.0000000  
## Yes 0.4285714 0.6666667 0.5000000 0.6666667 1.0000000 0.0000000  
##   
## 28.6 28.8 29 29.1 29.2 29.3  
## No 0.1428571 0.0000000 0.3333333 1.0000000 1.0000000 1.0000000  
## Yes 0.8571429 1.0000000 0.6666667 0.0000000 0.0000000 0.0000000  
##   
## 29.4 29.6 29.8 30 30.2 30.4  
## No 0.5000000 0.8333333 0.2500000 0.0000000 0.0000000 0.0000000  
## Yes 0.5000000 0.1666667 0.7500000 1.0000000 1.0000000 1.0000000  
##   
## 30.6 30.8 31 31.2 31.4 31.6  
## No 0.6000000 0.2500000 0.2000000 0.0000000 0.0000000 0.0000000  
## Yes 0.4000000 0.7500000 0.8000000 1.0000000 1.0000000 1.0000000  
##   
## 31.8 32 32.2 32.4 32.6 32.8  
## No 0.2857143 0.1250000 0.5000000 1.0000000 0.2500000 0.6666667  
## Yes 0.7142857 0.8750000 0.5000000 0.0000000 0.7500000 0.3333333  
##   
## 33 33.2 33.4 33.6 33.8 34  
## No 0.4285714 0.0000000 0.0000000 0.3333333 0.0000000 0.8000000  
## Yes 0.5714286 1.0000000 1.0000000 0.6666667 1.0000000 0.2000000  
##   
## 34.2 34.4 34.6 34.8 35 35.2  
## No 0.2500000 0.8000000 0.0000000 0.5714286 0.3333333 0.0000000  
## Yes 0.7500000 0.2000000 1.0000000 0.4285714 0.6666667 1.0000000  
##   
## 35.4 35.6 36 36.2 36.4 36.6  
## No 0.6666667 0.3333333 0.2000000 0.5000000 0.5000000 0.2000000  
## Yes 0.3333333 0.6666667 0.8000000 0.5000000 0.5000000 0.8000000  
##   
## 36.8 37 37.2 37.4 37.6 37.8  
## No 0.4000000 0.0000000 1.0000000 0.3333333 0.0000000 0.0000000  
## Yes 0.6000000 1.0000000 0.0000000 0.6666667 1.0000000 1.0000000  
##   
## 37.9 38 38.2 38.4 38.6 38.8  
## No 0.0000000 0.1428571 0.0000000 0.5000000 0.3333333 0.0000000  
## Yes 1.0000000 0.8571429 1.0000000 0.5000000 0.6666667 1.0000000  
##   
## 39 39.2 39.4 39.6 39.8 39.9  
## No 0.0000000 0.0000000 0.0000000 0.0000000 0.5000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 0.5000000 1.0000000  
##   
## 40 40.2 40.6 40.8 41 41.4  
## No 1.0000000 1.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 0.0000000 0.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 41.6 41.8 42 42.2 42.4 42.6  
## No 0.0000000 0.5000000 1.0000000 1.0000000 0.2500000 0.4000000  
## Yes 1.0000000 0.5000000 0.0000000 0.0000000 0.7500000 0.6000000  
##   
## 43 43.2 43.4 43.6 43.8 44  
## No 1.0000000 0.0000000 0.2500000 0.5000000 0.2500000 0.0000000  
## Yes 0.0000000 1.0000000 0.7500000 0.5000000 0.7500000 1.0000000  
##   
## 44.2 44.4 44.6 44.8 45 45.2  
## No 0.0000000 0.0000000 0.0000000 0.5000000 0.5000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 0.5000000 0.5000000 1.0000000  
##   
## 45.4 45.6 46.4 46.8 47 47.4  
## No 0.5000000 0.0000000 0.0000000 0.3333333 0.1666667 1.0000000  
## Yes 0.5000000 1.0000000 1.0000000 0.6666667 0.8333333 0.0000000  
##   
## 47.6 47.8 48 48.2 48.4 48.6  
## No 0.0000000 0.0000000 0.0000000 0.3333333 1.0000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 0.6666667 0.0000000 1.0000000  
##   
## 48.8 49 49.4 49.6 50.4 50.6  
## No 0.5000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 0.5000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 50.8 51 51.6 51.8 52.8 53  
## No 1.0000000 0.2000000 0.0000000 0.0000000 1.0000000 1.0000000  
## Yes 0.0000000 0.8000000 1.0000000 1.0000000 0.0000000 0.0000000  
##   
## 53.4 54 54.2 54.4 54.6 55  
## No 0.0000000 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000  
## Yes 1.0000000 1.0000000 0.0000000 1.0000000 1.0000000 1.0000000  
##   
## 55.2 55.4 55.6 56 56.8 57.4  
## No 1.0000000 1.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 0.0000000 0.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 57.8 58.4 58.6 59 59.2 59.6  
## No 0.5000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 0.5000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 59.8 60.4 60.6 61 61.2 61.4  
## No 0.0000000 0.0000000 0.0000000 0.0000000 0.3333333 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 0.6666667 1.0000000  
##   
## 62.8 63 63.4 64.2 64.8 65.2  
## No 1.0000000 0.0000000 0.0000000 0.0000000 0.0000000 1.0000000  
## Yes 0.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.0000000  
##   
## 65.6 65.8 66.2 67 68.2 68.4  
## No 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.5000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.5000000  
##   
## 68.8 69.2 69.6 69.8 70.4 71  
## No 1.0000000 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000  
## Yes 0.0000000 1.0000000 1.0000000 1.0000000 0.0000000 1.0000000  
##   
## 71.4 72.2 73.8 74.4 74.8 76  
## No 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 76.6 77.8 78.4 78.8 79 79.2  
## No 1.0000000 1.0000000 1.0000000 0.0000000 1.0000000 0.0000000  
## Yes 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000 1.0000000  
##   
## 79.4 79.8 80.4 80.6 81.8 82.6  
## No 0.0000000 1.0000000 0.0000000 1.0000000 1.0000000 0.0000000  
## Yes 1.0000000 0.0000000 1.0000000 0.0000000 0.0000000 1.0000000  
##   
## 83 83.2 83.6 84.8 86.8 87.6  
## No 1.0000000 0.0000000 0.5000000 0.0000000 1.0000000 0.0000000  
## Yes 0.0000000 1.0000000 0.5000000 1.0000000 0.0000000 1.0000000  
##   
## 87.8 88.6 89.8 92.2 93.6 93.8  
## No 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 95.6 96 96.4 99.4 102 104.2  
## No 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000  
##   
## 104.8 105.4 106.2 106.4 110.8 114.4  
## No 1.0000000 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000  
## Yes 0.0000000 1.0000000 1.0000000 1.0000000 0.0000000 1.0000000  
##   
## 118.6 119.4 120.8 122.8 127.6 129  
## No 1.0000000 0.0000000 0.0000000 0.0000000 0.0000000 1.0000000  
## Yes 0.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.0000000  
##   
## 132.5 132.6 136.4 140.2 147.2 157.8  
## No 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000 1.0000000  
## Yes 1.0000000 1.0000000 1.0000000 0.0000000 1.0000000 0.0000000  
##   
## 174.6 177.6 178.2 182.6 219.6 268.6  
## No 0.0000000 0.0000000 0.0000000 1.0000000 0.5000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 0.0000000 0.5000000 1.0000000

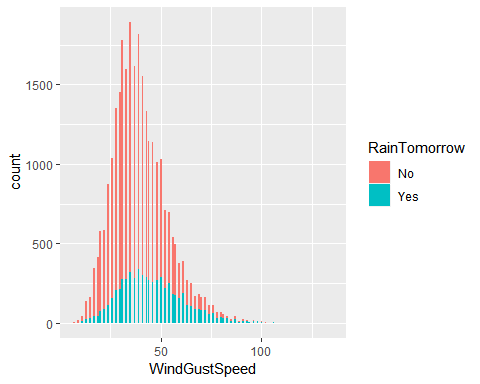
#Looking at the relationship of RainTomorrow to WindGustDir \*\*  
ggplot(rain\_complete, aes(x= WindGustDir, fill= RainTomorrow)) + geom\_bar()



#table view  
tb2 = table(rain\_complete$RainTomorrow, rain\_complete$WindGustDir) #creates table object  
prop.table(tb2, margin = 2) #crosstab with proportions

##   
## W WNW ENE NE NW NNE  
## No 0.7367387 0.7164887 0.8393524 0.8046823 0.7148688 0.7657588  
## Yes 0.2632613 0.2835113 0.1606476 0.1953177 0.2851312 0.2342412  
##   
## NNW E N WSW SE ESE  
## No 0.7031364 0.8389744 0.7319533 0.7572347 0.8122816 0.8243934  
## Yes 0.2968636 0.1610256 0.2680467 0.2427653 0.1877184 0.1756066  
##   
## SW S SSE SSW  
## No 0.7853711 0.7795727 0.8012552 0.7815904  
## Yes 0.2146289 0.2204273 0.1987448 0.2184096

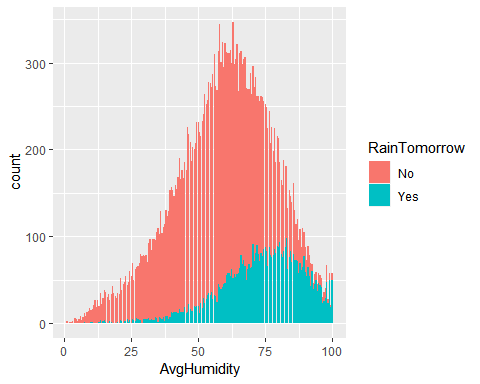
#Looking at the relationship of RainTomorrow to WindGustSpeed \*\*  
ggplot(rain\_complete, aes(x= WindGustSpeed, fill= RainTomorrow)) + geom\_bar()



#table view  
tb3 = table(rain\_complete$RainTomorrow, rain\_complete$WindGustSpeed) #creates table object  
prop.table(tb3, margin = 2) #crosstab with proportions

##   
## 7 9 11 13 15 17  
## No 0.8750000 0.8888889 0.7619048 0.8043478 0.8074534 0.8674352  
## Yes 0.1250000 0.1111111 0.2380952 0.1956522 0.1925466 0.1325648  
##   
## 19 20 22 24 26 28  
## No 0.8992806 0.8697917 0.8551959 0.8685714 0.8473430 0.8447894  
## Yes 0.1007194 0.1302083 0.1448041 0.1314286 0.1526570 0.1552106  
##   
## 30 31 33 35 37 39  
## No 0.8542955 0.8455056 0.8252974 0.8294615 0.8239654 0.8135314  
## Yes 0.1457045 0.1544944 0.1747026 0.1705385 0.1760346 0.1864686  
##   
## 41 43 44 46 48 50  
## No 0.8039974 0.7821187 0.7641921 0.7713281 0.7302372 0.7201166  
## Yes 0.1960026 0.2178813 0.2358079 0.2286719 0.2697628 0.2798834  
##   
## 52 54 56 57 59 61  
## No 0.6892655 0.6389685 0.6697417 0.6432866 0.5868421 0.5167959  
## Yes 0.3107345 0.3610315 0.3302583 0.3567134 0.4131579 0.4832041  
##   
## 63 65 67 69 70 72  
## No 0.5934066 0.5731225 0.5000000 0.5164835 0.5153374 0.5151515  
## Yes 0.4065934 0.4268775 0.5000000 0.4835165 0.4846626 0.4848485  
##   
## 74 76 78 80 81 83  
## No 0.4867257 0.4594595 0.4925373 0.4507042 0.4915254 0.3478261  
## Yes 0.5132743 0.5405405 0.5074627 0.5492958 0.5084746 0.6521739  
##   
## 85 87 89 91 93 94  
## No 0.4400000 0.4390244 0.3636364 0.3181818 0.5000000 0.5000000  
## Yes 0.5600000 0.5609756 0.6363636 0.6818182 0.5000000 0.5000000  
##   
## 96 98 100 102 104 106  
## No 0.2941176 0.2666667 0.6666667 0.6000000 0.5000000 0.2000000  
## Yes 0.7058824 0.7333333 0.3333333 0.4000000 0.5000000 0.8000000  
##   
## 107 109 117 120 126 135  
## No 0.0000000 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000  
## Yes 1.0000000 1.0000000 1.0000000 1.0000000 0.0000000 1.0000000

#Looking at the relationship of RainTomorrow to AvgHumidity \*\*\*  
ggplot(rain\_complete, aes(x= AvgHumidity, fill= RainTomorrow)) + geom\_bar()



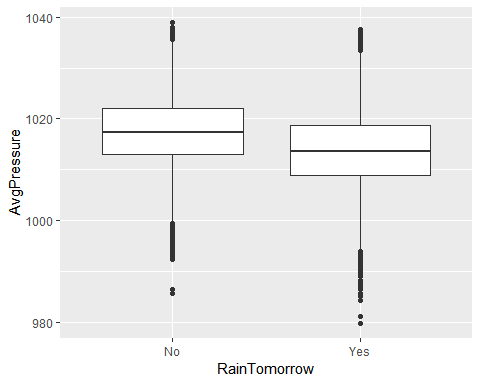
ggsave("humidity.png")

## Saving 5 x 4 in image

#table view  
tb4 = table(rain\_complete$RainTomorrow, rain\_complete$AvgHumidity) #creates table object  
prop.table(tb4, margin = 2) #crosstab with proportions

##   
## 1 2 2.5 3 4  
## No 1.000000000 1.000000000 1.000000000 1.000000000 1.000000000  
## Yes 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000  
##   
## 4.5 5 5.5 6 6.5  
## No 1.000000000 1.000000000 1.000000000 1.000000000 1.000000000  
## Yes 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000  
##   
## 7 7.5 8 8.5 9  
## No 1.000000000 0.916666667 1.000000000 1.000000000 1.000000000  
## Yes 0.000000000 0.083333333 0.000000000 0.000000000 0.000000000  
##   
## 9.5 10 10.5 11 11.5  
## No 1.000000000 0.933333333 0.937500000 1.000000000 1.000000000  
## Yes 0.000000000 0.066666667 0.062500000 0.000000000 0.000000000  
##   
## 12 12.5 13 13.5 14  
## No 1.000000000 1.000000000 0.950000000 0.911764706 1.000000000  
## Yes 0.000000000 0.000000000 0.050000000 0.088235294 0.000000000  
##   
## 14.5 15 15.5 16 16.5  
## No 0.931034483 0.921052632 0.972222222 1.000000000 1.000000000  
## Yes 0.068965517 0.078947368 0.027777778 0.000000000 0.000000000  
##   
## 17 17.5 18 18.5 19  
## No 0.923076923 0.969696970 1.000000000 1.000000000 1.000000000  
## Yes 0.076923077 0.030303030 0.000000000 0.000000000 0.000000000  
##   
## 19.5 20 20.5 21 21.5  
## No 1.000000000 0.971428571 1.000000000 0.942307692 0.947368421  
## Yes 0.000000000 0.028571429 0.000000000 0.057692308 0.052631579  
##   
## 22 22.5 23 23.5 24  
## No 1.000000000 0.957446809 0.962962963 0.909090909 0.978723404  
## Yes 0.000000000 0.042553191 0.037037037 0.090909091 0.021276596  
##   
## 24.5 25 25.5 26 26.5  
## No 0.950000000 1.000000000 0.927536232 0.938775510 0.967741935  
## Yes 0.050000000 0.000000000 0.072463768 0.061224490 0.032258065  
##   
## 27 27.5 28 28.5 29  
## No 0.907692308 0.939393939 0.956521739 0.962500000 1.000000000  
## Yes 0.092307692 0.060606061 0.043478261 0.037500000 0.000000000  
##   
## 29.5 30 30.5 31 31.5  
## No 0.935897436 0.948051948 0.935897436 0.928571429 0.934782609  
## Yes 0.064102564 0.051948052 0.064102564 0.071428571 0.065217391  
##   
## 32 32.5 33 33.5 34  
## No 0.969072165 0.940476190 0.969072165 0.969072165 0.927083333  
## Yes 0.030927835 0.059523810 0.030927835 0.030927835 0.072916667  
##   
## 34.5 35 35.5 36 36.5  
## No 0.942857143 0.990825688 0.931372549 0.953488372 0.951923077  
## Yes 0.057142857 0.009174312 0.068627451 0.046511628 0.048076923  
##   
## 37 37.5 38 38.5 39  
## No 0.936936937 0.982456140 0.938461538 0.934959350 0.961240310  
## Yes 0.063063063 0.017543860 0.061538462 0.065040650 0.038759690  
##   
## 39.5 40 40.5 41 41.5  
## No 0.954248366 0.917197452 0.928104575 0.910958904 0.918238994  
## Yes 0.045751634 0.082802548 0.071895425 0.089041096 0.081761006  
##   
## 42 42.5 43 43.5 44  
## No 0.915584416 0.928571429 0.915789474 0.921686747 0.926136364  
## Yes 0.084415584 0.071428571 0.084210526 0.078313253 0.073863636  
##   
## 44.5 45 45.5 46 46.5  
## No 0.922155689 0.902702703 0.937500000 0.942477876 0.899082569  
## Yes 0.077844311 0.097297297 0.062500000 0.057522124 0.100917431  
##   
## 47 47.5 48 48.5 49  
## No 0.923076923 0.925133690 0.931034483 0.905000000 0.913043478  
## Yes 0.076923077 0.074866310 0.068965517 0.095000000 0.086956522  
##   
## 49.5 50 50.5 51 51.5  
## No 0.913793103 0.917748918 0.950000000 0.893023256 0.927038627  
## Yes 0.086206897 0.082251082 0.050000000 0.106976744 0.072961373  
##   
## 52 52.5 53 53.5 54  
## No 0.879668050 0.912878788 0.892857143 0.875486381 0.874100719  
## Yes 0.120331950 0.087121212 0.107142857 0.124513619 0.125899281  
##   
## 54.5 55 55.5 56 56.5  
## No 0.884476534 0.867647059 0.905923345 0.896774194 0.886446886  
## Yes 0.115523466 0.132352941 0.094076655 0.103225806 0.113553114  
##   
## 57 57.5 58 58.5 59  
## No 0.910780669 0.856230032 0.880813953 0.870431894 0.873456790  
## Yes 0.089219331 0.143769968 0.119186047 0.129568106 0.126543210  
##   
## 59.5 60 60.5 61 61.5  
## No 0.847457627 0.857585139 0.823717949 0.813504823 0.816720257  
## Yes 0.152542373 0.142414861 0.176282051 0.186495177 0.183279743  
##   
## 62 62.5 63 63.5 64  
## No 0.828025478 0.793333333 0.850144092 0.812080537 0.825657895  
## Yes 0.171974522 0.206666667 0.149855908 0.187919463 0.174342105  
##   
## 64.5 65 65.5 66 66.5  
## No 0.825545171 0.782771536 0.797427653 0.750798722 0.771812081  
## Yes 0.174454829 0.217228464 0.202572347 0.249201278 0.228187919  
##   
## 67 67.5 68 68.5 69  
## No 0.759868421 0.785016287 0.815498155 0.770370370 0.748148148  
## Yes 0.240131579 0.214983713 0.184501845 0.229629630 0.251851852  
##   
## 69.5 70 70.5 71 71.5  
## No 0.781250000 0.757575758 0.692567568 0.738970588 0.714788732  
## Yes 0.218750000 0.242424242 0.307432432 0.261029412 0.285211268  
##   
## 72 72.5 73 73.5 74  
## No 0.655172414 0.698473282 0.722656250 0.690839695 0.703846154  
## Yes 0.344827586 0.301526718 0.277343750 0.309160305 0.296153846  
##   
## 74.5 75 75.5 76 76.5  
## No 0.667968750 0.650793651 0.666666667 0.706666667 0.639344262  
## Yes 0.332031250 0.349206349 0.333333333 0.293333333 0.360655738  
##   
## 77 77.5 78 78.5 79  
## No 0.623188406 0.663716814 0.606060606 0.622222222 0.562162162  
## Yes 0.376811594 0.336283186 0.393939394 0.377777778 0.437837838  
##   
## 79.5 80 80.5 81 81.5  
## No 0.586046512 0.591549296 0.500000000 0.521212121 0.522012579  
## Yes 0.413953488 0.408450704 0.500000000 0.478787879 0.477987421  
##   
## 82 82.5 83 83.5 84  
## No 0.558510638 0.519337017 0.458563536 0.533834586 0.503267974  
## Yes 0.441489362 0.480662983 0.541436464 0.466165414 0.496732026  
##   
## 84.5 85 85.5 86 86.5  
## No 0.431506849 0.496402878 0.503105590 0.438461538 0.359649123  
## Yes 0.568493151 0.503597122 0.496894410 0.561538462 0.640350877  
##   
## 87 87.5 88 88.5 89  
## No 0.408333333 0.406250000 0.361111111 0.306818182 0.412844037  
## Yes 0.591666667 0.593750000 0.638888889 0.693181818 0.587155963  
##   
## 89.5 90 90.5 91 91.5  
## No 0.266666667 0.329545455 0.260273973 0.280898876 0.307692308  
## Yes 0.733333333 0.670454545 0.739726027 0.719101124 0.692307692  
##   
## 92 92.5 93 93.5 94  
## No 0.376811594 0.117647059 0.152173913 0.196428571 0.169491525  
## Yes 0.623188406 0.882352941 0.847826087 0.803571429 0.830508475  
##   
## 94.5 95 95.5 96 96.5  
## No 0.177777778 0.192982456 0.200000000 0.211538462 0.233333333  
## Yes 0.822222222 0.807017544 0.800000000 0.788461538 0.766666667  
##   
## 97 97.5 98 98.5 99  
## No 0.305555556 0.275000000 0.298507463 0.148148148 0.122807018  
## Yes 0.694444444 0.725000000 0.701492537 0.851851852 0.877192982  
##   
## 99.5 100  
## No 0.142857143 0.140350877  
## Yes 0.857142857 0.859649123

#Looking at the relationship of RainTomorrow to AvgPressure \*\*  
ggplot(rain\_complete, aes(x=RainTomorrow , y= AvgPressure)) + geom\_boxplot()



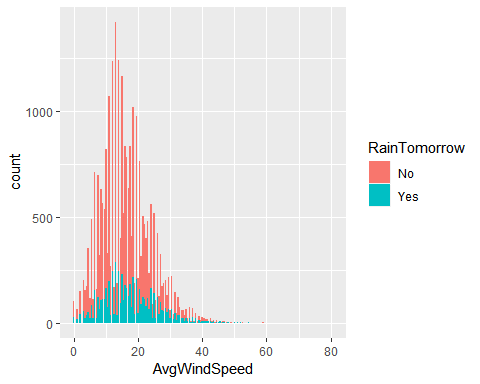
ggsave("pressure.png")

## Saving 5 x 4 in image

#table view  
tb6 = table(rain\_complete$RainTomorrow, rain\_complete$AvgPressure) #creates table object  
prop.table(tb6, margin = 2) #crosstab with proportions

##   
## 979.75 981.05 984.35 985 985.15 985.65  
## No 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
##   
## 985.7 986.35 986.4 986.8 987 987.35  
## No 0.50000000 0.00000000 1.00000000 0.00000000 0.00000000 0.00000000  
## Yes 0.50000000 1.00000000 0.00000000 1.00000000 1.00000000 1.00000000  
##   
## 987.85 988.2 988.95 989.3 990 990.3  
## No 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
##   
## 990.35 990.55 990.9 991.25 991.35 991.5  
## No 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
##   
## 991.75 991.8 992.05 992.15 992.25 992.35  
## No 0.00000000 0.00000000 0.00000000 0.00000000 1.00000000 1.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 0.00000000 0.00000000  
##   
## 992.4 992.75 992.9 992.95 993 993.1  
## No 0.50000000 1.00000000 0.00000000 0.00000000 1.00000000 0.00000000  
## Yes 0.50000000 0.00000000 1.00000000 1.00000000 0.00000000 1.00000000  
##   
## 993.2 993.3 993.35 993.5 993.55 993.6  
## No 0.00000000 0.00000000 0.00000000 0.00000000 1.00000000 0.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 0.00000000 1.00000000  
##   
## 993.65 993.7 993.9 993.95 994 994.05  
## No 0.00000000 0.00000000 0.00000000 1.00000000 0.00000000 0.50000000  
## Yes 1.00000000 1.00000000 1.00000000 0.00000000 1.00000000 0.50000000  
##   
## 994.1 994.2 994.25 994.5 994.55 994.6  
## No 1.00000000 0.80000000 0.00000000 0.00000000 0.00000000 0.00000000  
## Yes 0.00000000 0.20000000 1.00000000 1.00000000 1.00000000 1.00000000  
##   
## 994.75 994.8 994.95 995 995.1 995.15  
## No 0.00000000 1.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
## Yes 1.00000000 0.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
##   
## 995.25 995.3 995.35 995.4 995.45 995.5  
## No 0.00000000 0.00000000 0.00000000 0.00000000 0.50000000 0.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 0.50000000 1.00000000  
##   
## 995.55 995.6 995.65 995.7 995.75 995.8  
## No 0.33333333 0.00000000 0.00000000 0.75000000 0.00000000 1.00000000  
## Yes 0.66666667 1.00000000 1.00000000 0.25000000 1.00000000 0.00000000  
##   
## 995.9 995.95 996 996.1 996.2 996.25  
## No 0.60000000 1.00000000 0.00000000 1.00000000 0.00000000 1.00000000  
## Yes 0.40000000 0.00000000 1.00000000 0.00000000 1.00000000 0.00000000  
##   
## 996.35 996.4 996.5 996.6 996.65 996.7  
## No 0.00000000 0.00000000 1.00000000 0.00000000 0.00000000 0.00000000  
## Yes 1.00000000 1.00000000 0.00000000 1.00000000 1.00000000 1.00000000  
##   
## 996.75 996.8 996.9 996.95 997 997.05  
## No 0.50000000 0.50000000 0.00000000 1.00000000 0.00000000 0.00000000  
## Yes 0.50000000 0.50000000 1.00000000 0.00000000 1.00000000 1.00000000  
##   
## 997.1 997.15 997.2 997.25 997.3 997.35  
## No 0.00000000 0.00000000 0.00000000 1.00000000 1.00000000 1.00000000  
## Yes 1.00000000 1.00000000 1.00000000 0.00000000 0.00000000 0.00000000  
##   
## 997.4 997.5 997.55 997.6 997.65 997.7  
## No 0.00000000 0.00000000 1.00000000 1.00000000 0.50000000 0.00000000  
## Yes 1.00000000 1.00000000 0.00000000 0.00000000 0.50000000 1.00000000  
##   
## 997.75 997.85 997.9 997.95 998 998.05  
## No 0.40000000 0.00000000 0.50000000 0.50000000 0.00000000 0.00000000  
## Yes 0.60000000 1.00000000 0.50000000 0.50000000 1.00000000 1.00000000  
##   
## 998.1 998.15 998.2 998.25 998.3 998.35  
## No 0.00000000 1.00000000 0.50000000 0.00000000 1.00000000 0.66666667  
## Yes 1.00000000 0.00000000 0.50000000 1.00000000 0.00000000 0.33333333  
##   
## 998.4 998.45 998.5 998.55 998.6 998.65  
## No 0.00000000 0.50000000 0.00000000 0.66666667 0.00000000 1.00000000  
## Yes 1.00000000 0.50000000 1.00000000 0.33333333 1.00000000 0.00000000  
##   
## 998.7 998.75 998.85 998.9 998.95 999  
## No 0.00000000 0.25000000 0.00000000 0.25000000 0.44444444 0.66666667  
## Yes 1.00000000 0.75000000 1.00000000 0.75000000 0.55555556 0.33333333  
##   
## 999.05 999.1 999.15 999.2 999.25 999.3  
## No 0.33333333 0.40000000 0.66666667 0.40000000 0.40000000 0.00000000  
## Yes 0.66666667 0.60000000 0.33333333 0.60000000 0.60000000 1.00000000  
##   
## 999.35 999.4 999.45 999.5 999.55 999.6  
## No 0.50000000 0.40000000 0.50000000 0.11111111 0.66666667 0.20000000  
## Yes 0.50000000 0.60000000 0.50000000 0.88888889 0.33333333 0.80000000  
##   
## 999.65 999.7 999.75 999.8 999.85 999.9  
## No 0.00000000 0.66666667 0.25000000 0.00000000 0.50000000 0.33333333  
## Yes 1.00000000 0.33333333 0.75000000 1.00000000 0.50000000 0.66666667  
##   
## 999.95 1000 1000.05 1000.1 1000.15 1000.2  
## No 1.00000000 0.75000000 1.00000000 0.40000000 0.75000000 0.00000000  
## Yes 0.00000000 0.25000000 0.00000000 0.60000000 0.25000000 1.00000000  
##   
## 1000.25 1000.3 1000.35 1000.4 1000.45 1000.5  
## No 0.57142857 0.40000000 0.50000000 0.00000000 0.40000000 0.50000000  
## Yes 0.42857143 0.60000000 0.50000000 1.00000000 0.60000000 0.50000000  
##   
## 1000.55 1000.6 1000.65 1000.7 1000.75 1000.8  
## No 0.40000000 0.75000000 0.00000000 0.42857143 0.33333333 0.40000000  
## Yes 0.60000000 0.25000000 1.00000000 0.57142857 0.66666667 0.60000000  
##   
## 1000.85 1000.9 1000.95 1001 1001.05 1001.1  
## No 0.00000000 0.00000000 0.40000000 0.44444444 0.00000000 0.40000000  
## Yes 1.00000000 1.00000000 0.60000000 0.55555556 1.00000000 0.60000000  
##   
## 1001.15 1001.2 1001.25 1001.3 1001.35 1001.4  
## No 0.33333333 0.57142857 0.00000000 0.50000000 0.66666667 0.40000000  
## Yes 0.66666667 0.42857143 1.00000000 0.50000000 0.33333333 0.60000000  
##   
## 1001.45 1001.55 1001.6 1001.65 1001.7 1001.75  
## No 0.37500000 0.75000000 0.40000000 0.70000000 0.25000000 0.42857143  
## Yes 0.62500000 0.25000000 0.60000000 0.30000000 0.75000000 0.57142857  
##   
## 1001.8 1001.85 1001.9 1001.95 1002 1002.05  
## No 0.75000000 0.57142857 0.50000000 0.46153846 0.33333333 0.42857143  
## Yes 0.25000000 0.42857143 0.50000000 0.53846154 0.66666667 0.57142857  
##   
## 1002.1 1002.15 1002.2 1002.25 1002.3 1002.35  
## No 0.44444444 0.71428571 0.62500000 0.40000000 0.71428571 0.50000000  
## Yes 0.55555556 0.28571429 0.37500000 0.60000000 0.28571429 0.50000000  
##   
## 1002.4 1002.45 1002.5 1002.55 1002.6 1002.65  
## No 0.61538462 0.42857143 0.75000000 0.44444444 0.50000000 0.61538462  
## Yes 0.38461538 0.57142857 0.25000000 0.55555556 0.50000000 0.38461538  
##   
## 1002.7 1002.75 1002.8 1002.85 1002.9 1002.95  
## No 0.33333333 0.70588235 0.55555556 0.50000000 0.75000000 0.57142857  
## Yes 0.66666667 0.29411765 0.44444444 0.50000000 0.25000000 0.42857143  
##   
## 1003 1003.05 1003.1 1003.15 1003.2 1003.25  
## No 0.66666667 0.42857143 0.46153846 0.35714286 0.30000000 0.40000000  
## Yes 0.33333333 0.57142857 0.53846154 0.64285714 0.70000000 0.60000000  
##   
## 1003.3 1003.35 1003.4 1003.45 1003.5 1003.55  
## No 0.50000000 0.66666667 0.57142857 0.52941176 0.50000000 0.85714286  
## Yes 0.50000000 0.33333333 0.42857143 0.47058824 0.50000000 0.14285714  
##   
## 1003.6 1003.65 1003.7 1003.75 1003.8 1003.85  
## No 0.72727273 0.71428571 0.54545455 0.57894737 0.57894737 0.61538462  
## Yes 0.27272727 0.28571429 0.45454545 0.42105263 0.42105263 0.38461538  
##   
## 1003.9 1003.95 1004 1004.05 1004.1 1004.15  
## No 0.54545455 0.50000000 0.66666667 0.50000000 0.82352941 0.62500000  
## Yes 0.45454545 0.50000000 0.33333333 0.50000000 0.17647059 0.37500000  
##   
## 1004.2 1004.25 1004.3 1004.35 1004.4 1004.45  
## No 0.43750000 0.25000000 0.33333333 0.57142857 0.58333333 0.42105263  
## Yes 0.56250000 0.75000000 0.66666667 0.42857143 0.41666667 0.57894737  
##   
## 1004.5 1004.55 1004.6 1004.65 1004.7 1004.75  
## No 0.81250000 0.61538462 0.68965517 0.59090909 0.30000000 0.53333333  
## Yes 0.18750000 0.38461538 0.31034483 0.40909091 0.70000000 0.46666667  
##   
## 1004.8 1004.85 1004.9 1004.95 1005 1005.05  
## No 0.41666667 0.50000000 0.38888889 0.38888889 0.62962963 0.47619048  
## Yes 0.58333333 0.50000000 0.61111111 0.61111111 0.37037037 0.52380952  
##   
## 1005.1 1005.15 1005.2 1005.25 1005.3 1005.35  
## No 0.66666667 0.55555556 0.40000000 0.58333333 0.52777778 0.33333333  
## Yes 0.33333333 0.44444444 0.60000000 0.41666667 0.47222222 0.66666667  
##   
## 1005.4 1005.45 1005.5 1005.55 1005.6 1005.65  
## No 0.27272727 0.42857143 0.58823529 0.58823529 0.46153846 0.59090909  
## Yes 0.72727273 0.57142857 0.41176471 0.41176471 0.53846154 0.40909091  
##   
## 1005.7 1005.75 1005.8 1005.85 1005.9 1005.95  
## No 0.66666667 0.61538462 0.52941176 0.52380952 0.86666667 0.63333333  
## Yes 0.33333333 0.38461538 0.47058824 0.47619048 0.13333333 0.36666667  
##   
## 1006 1006.05 1006.1 1006.15 1006.2 1006.25  
## No 0.68421053 0.37500000 0.50000000 0.47058824 0.78260870 0.57894737  
## Yes 0.31578947 0.62500000 0.50000000 0.52941176 0.21739130 0.42105263  
##   
## 1006.3 1006.35 1006.4 1006.45 1006.5 1006.55  
## No 0.56000000 0.69565217 0.52631579 0.60606061 0.66666667 0.39285714  
## Yes 0.44000000 0.30434783 0.47368421 0.39393939 0.33333333 0.60714286  
##   
## 1006.6 1006.65 1006.7 1006.75 1006.8 1006.85  
## No 0.48148148 0.52631579 0.56000000 0.53333333 0.65000000 0.68000000  
## Yes 0.51851852 0.47368421 0.44000000 0.46666667 0.35000000 0.32000000  
##   
## 1006.9 1006.95 1007 1007.05 1007.1 1007.15  
## No 0.57500000 0.54545455 0.75862069 0.55555556 0.74193548 0.70833333  
## Yes 0.42500000 0.45454545 0.24137931 0.44444444 0.25806452 0.29166667  
##   
## 1007.2 1007.25 1007.3 1007.35 1007.4 1007.45  
## No 0.78947368 0.63333333 0.67567568 0.44827586 0.72000000 0.65000000  
## Yes 0.21052632 0.36666667 0.32432432 0.55172414 0.28000000 0.35000000  
##   
## 1007.5 1007.55 1007.6 1007.65 1007.7 1007.75  
## No 0.59259259 0.62857143 0.62162162 0.57500000 0.58974359 0.68965517  
## Yes 0.40740741 0.37142857 0.37837838 0.42500000 0.41025641 0.31034483  
##   
## 1007.8 1007.85 1007.9 1007.95 1008 1008.05  
## No 0.63414634 0.62500000 0.58333333 0.79487179 0.51351351 0.57894737  
## Yes 0.36585366 0.37500000 0.41666667 0.20512821 0.48648649 0.42105263  
##   
## 1008.1 1008.15 1008.2 1008.25 1008.3 1008.35  
## No 0.53333333 0.58139535 0.62500000 0.74193548 0.68181818 0.59183673  
## Yes 0.46666667 0.41860465 0.37500000 0.25806452 0.31818182 0.40816327  
##   
## 1008.4 1008.45 1008.5 1008.55 1008.6 1008.65  
## No 0.75000000 0.60000000 0.64864865 0.60869565 0.52380952 0.47619048  
## Yes 0.25000000 0.40000000 0.35135135 0.39130435 0.47619048 0.52380952  
##   
## 1008.7 1008.75 1008.8 1008.85 1008.9 1008.95  
## No 0.68000000 0.63636364 0.59183673 0.45000000 0.68421053 0.62745098  
## Yes 0.32000000 0.36363636 0.40816327 0.55000000 0.31578947 0.37254902  
##   
## 1009 1009.05 1009.1 1009.15 1009.2 1009.25  
## No 0.54285714 0.71739130 0.67241379 0.69565217 0.80327869 0.61818182  
## Yes 0.45714286 0.28260870 0.32758621 0.30434783 0.19672131 0.38181818  
##   
## 1009.3 1009.35 1009.4 1009.45 1009.5 1009.55  
## No 0.70212766 0.59183673 0.67391304 0.61818182 0.63043478 0.79245283  
## Yes 0.29787234 0.40816327 0.32608696 0.38181818 0.36956522 0.20754717  
##   
## 1009.6 1009.65 1009.7 1009.75 1009.8 1009.85  
## No 0.60714286 0.63157895 0.70967742 0.72093023 0.63888889 0.62000000  
## Yes 0.39285714 0.36842105 0.29032258 0.27906977 0.36111111 0.38000000  
##   
## 1009.9 1009.95 1010 1010.05 1010.1 1010.15  
## No 0.68965517 0.75000000 0.67391304 0.78431373 0.65306122 0.68518519  
## Yes 0.31034483 0.25000000 0.32608696 0.21568627 0.34693878 0.31481481  
##   
## 1010.2 1010.25 1010.3 1010.35 1010.4 1010.45  
## No 0.67796610 0.57407407 0.71111111 0.71666667 0.78431373 0.71666667  
## Yes 0.32203390 0.42592593 0.28888889 0.28333333 0.21568627 0.28333333  
##   
## 1010.5 1010.55 1010.6 1010.65 1010.7 1010.75  
## No 0.59183673 0.66176471 0.69491525 0.67307692 0.64912281 0.75806452  
## Yes 0.40816327 0.33823529 0.30508475 0.32692308 0.35087719 0.24193548  
##   
## 1010.8 1010.85 1010.9 1010.95 1011 1011.05  
## No 0.75000000 0.74285714 0.70967742 0.70491803 0.77272727 0.78571429  
## Yes 0.25000000 0.25714286 0.29032258 0.29508197 0.22727273 0.21428571  
##   
## 1011.1 1011.15 1011.2 1011.25 1011.3 1011.35  
## No 0.64912281 0.70588235 0.71666667 0.73750000 0.65217391 0.71428571  
## Yes 0.35087719 0.29411765 0.28333333 0.26250000 0.34782609 0.28571429  
##   
## 1011.4 1011.45 1011.5 1011.55 1011.6 1011.65  
## No 0.73770492 0.84615385 0.73214286 0.65822785 0.79365079 0.69014085  
## Yes 0.26229508 0.15384615 0.26785714 0.34177215 0.20634921 0.30985915  
##   
## 1011.7 1011.75 1011.8 1011.85 1011.9 1011.95  
## No 0.81818182 0.81818182 0.76666667 0.76562500 0.81012658 0.64150943  
## Yes 0.18181818 0.18181818 0.23333333 0.23437500 0.18987342 0.35849057  
##   
## 1012 1012.05 1012.1 1012.15 1012.2 1012.25  
## No 0.69863014 0.74576271 0.58000000 0.63492063 0.72058824 0.78333333  
## Yes 0.30136986 0.25423729 0.42000000 0.36507937 0.27941176 0.21666667  
##   
## 1012.3 1012.35 1012.4 1012.45 1012.5 1012.55  
## No 0.71428571 0.77586207 0.70491803 0.79710145 0.80303030 0.83333333  
## Yes 0.28571429 0.22413793 0.29508197 0.20289855 0.19696970 0.16666667  
##   
## 1012.6 1012.65 1012.7 1012.75 1012.8 1012.85  
## No 0.72500000 0.68253968 0.81250000 0.74074074 0.75641026 0.75000000  
## Yes 0.27500000 0.31746032 0.18750000 0.25925926 0.24358974 0.25000000  
##   
## 1012.9 1012.95 1013 1013.05 1013.1 1013.15  
## No 0.78378378 0.79787234 0.81250000 0.72058824 0.71641791 0.77464789  
## Yes 0.21621622 0.20212766 0.18750000 0.27941176 0.28358209 0.22535211  
##   
## 1013.2 1013.25 1013.3 1013.35 1013.4 1013.45  
## No 0.76470588 0.69736842 0.76388889 0.76811594 0.79487179 0.84482759  
## Yes 0.23529412 0.30263158 0.23611111 0.23188406 0.20512821 0.15517241  
##   
## 1013.5 1013.55 1013.6 1013.65 1013.7 1013.75  
## No 0.83098592 0.87837838 0.74358974 0.78651685 0.81081081 0.70769231  
## Yes 0.16901408 0.12162162 0.25641026 0.21348315 0.18918919 0.29230769  
##   
## 1013.8 1013.85 1013.9 1013.95 1014 1014.05  
## No 0.80357143 0.77142857 0.73493976 0.81818182 0.71739130 0.80645161  
## Yes 0.19642857 0.22857143 0.26506024 0.18181818 0.28260870 0.19354839  
##   
## 1014.1 1014.15 1014.2 1014.25 1014.3 1014.35  
## No 0.80000000 0.73239437 0.88461538 0.80232558 0.75384615 0.66666667  
## Yes 0.20000000 0.26760563 0.11538462 0.19767442 0.24615385 0.33333333  
##   
## 1014.4 1014.45 1014.5 1014.55 1014.6 1014.65  
## No 0.76056338 0.78481013 0.87500000 0.76000000 0.71666667 0.73417722  
## Yes 0.23943662 0.21518987 0.12500000 0.24000000 0.28333333 0.26582278  
##   
## 1014.7 1014.75 1014.8 1014.85 1014.9 1014.95  
## No 0.75294118 0.74025974 0.88059701 0.83823529 0.81318681 0.84000000  
## Yes 0.24705882 0.25974026 0.11940299 0.16176471 0.18681319 0.16000000  
##   
## 1015 1015.05 1015.1 1015.15 1015.2 1015.25  
## No 0.77631579 0.83544304 0.77500000 0.82142857 0.81443299 0.76744186  
## Yes 0.22368421 0.16455696 0.22500000 0.17857143 0.18556701 0.23255814  
##   
## 1015.3 1015.35 1015.4 1015.45 1015.5 1015.55  
## No 0.88000000 0.79729730 0.77777778 0.78125000 0.74324324 0.84269663  
## Yes 0.12000000 0.20270270 0.22222222 0.21875000 0.25675676 0.15730337  
##   
## 1015.6 1015.65 1015.7 1015.75 1015.8 1015.85  
## No 0.80722892 0.83823529 0.79545455 0.80000000 0.83544304 0.82051282  
## Yes 0.19277108 0.16176471 0.20454545 0.20000000 0.16455696 0.17948718  
##   
## 1015.9 1015.95 1016 1016.05 1016.1 1016.15  
## No 0.81318681 0.85000000 0.75247525 0.81012658 0.85869565 0.77500000  
## Yes 0.18681319 0.15000000 0.24752475 0.18987342 0.14130435 0.22500000  
##   
## 1016.2 1016.25 1016.3 1016.35 1016.4 1016.45  
## No 0.74074074 0.81690141 0.83720930 0.77380952 0.80898876 0.77647059  
## Yes 0.25925926 0.18309859 0.16279070 0.22619048 0.19101124 0.22352941  
##   
## 1016.5 1016.55 1016.6 1016.65 1016.7 1016.75  
## No 0.79220779 0.79729730 0.82051282 0.86904762 0.73684211 0.76923077  
## Yes 0.20779221 0.20270270 0.17948718 0.13095238 0.26315789 0.23076923  
##   
## 1016.8 1016.85 1016.9 1016.95 1017 1017.05  
## No 0.82758621 0.83333333 0.80898876 0.81159420 0.77173913 0.82608696  
## Yes 0.17241379 0.16666667 0.19101124 0.18840580 0.22826087 0.17391304  
##   
## 1017.1 1017.15 1017.2 1017.25 1017.3 1017.35  
## No 0.77333333 0.81250000 0.83870968 0.84615385 0.78378378 0.84375000  
## Yes 0.22666667 0.18750000 0.16129032 0.15384615 0.21621622 0.15625000  
##   
## 1017.4 1017.45 1017.5 1017.55 1017.6 1017.65  
## No 0.81395349 0.81818182 0.86666667 0.74647887 0.84946237 0.78431373  
## Yes 0.18604651 0.18181818 0.13333333 0.25352113 0.15053763 0.21568627  
##   
## 1017.7 1017.75 1017.8 1017.85 1017.9 1017.95  
## No 0.87356322 0.82857143 0.80487805 0.79661017 0.73972603 0.83750000  
## Yes 0.12643678 0.17142857 0.19512195 0.20338983 0.26027397 0.16250000  
##   
## 1018 1018.05 1018.1 1018.15 1018.2 1018.25  
## No 0.84337349 0.82278481 0.85714286 0.82456140 0.74285714 0.83783784  
## Yes 0.15662651 0.17721519 0.14285714 0.17543860 0.25714286 0.16216216  
##   
## 1018.3 1018.35 1018.4 1018.45 1018.5 1018.55  
## No 0.83950617 0.87142857 0.83116883 0.77777778 0.83908046 0.81428571  
## Yes 0.16049383 0.12857143 0.16883117 0.22222222 0.16091954 0.18571429  
##   
## 1018.6 1018.65 1018.7 1018.75 1018.8 1018.85  
## No 0.83582090 0.80000000 0.78750000 0.77966102 0.78313253 0.72413793  
## Yes 0.16417910 0.20000000 0.21250000 0.22033898 0.21686747 0.27586207  
##   
## 1018.9 1018.95 1019 1019.05 1019.1 1019.15  
## No 0.86585366 0.84523810 0.77083333 0.81538462 0.81666667 0.80281690  
## Yes 0.13414634 0.15476190 0.22916667 0.18461538 0.18333333 0.19718310  
##   
## 1019.2 1019.25 1019.3 1019.35 1019.4 1019.45  
## No 0.73076923 0.80519481 0.83333333 0.80952381 0.86153846 0.80000000  
## Yes 0.26923077 0.19480519 0.16666667 0.19047619 0.13846154 0.20000000  
##   
## 1019.5 1019.55 1019.6 1019.65 1019.7 1019.75  
## No 0.84615385 0.82758621 0.80000000 0.85542169 0.77192982 0.85185185  
## Yes 0.15384615 0.17241379 0.20000000 0.14457831 0.22807018 0.14814815  
##   
## 1019.8 1019.85 1019.9 1019.95 1020 1020.05  
## No 0.78750000 0.84126984 0.85227273 0.80952381 0.89743590 0.87301587  
## Yes 0.21250000 0.15873016 0.14772727 0.19047619 0.10256410 0.12698413  
##   
## 1020.1 1020.15 1020.2 1020.25 1020.3 1020.35  
## No 0.83544304 0.81944444 0.85245902 0.90000000 0.86440678 0.82812500  
## Yes 0.16455696 0.18055556 0.14754098 0.10000000 0.13559322 0.17187500  
##   
## 1020.4 1020.45 1020.5 1020.55 1020.6 1020.65  
## No 0.82894737 0.86486486 0.82812500 0.88571429 0.78947368 0.85294118  
## Yes 0.17105263 0.13513514 0.17187500 0.11428571 0.21052632 0.14705882  
##   
## 1020.7 1020.75 1020.8 1020.85 1020.9 1020.95  
## No 0.85074627 0.83333333 0.86666667 0.87500000 0.83333333 0.77777778  
## Yes 0.14925373 0.16666667 0.13333333 0.12500000 0.16666667 0.22222222  
##   
## 1021 1021.05 1021.1 1021.15 1021.2 1021.25  
## No 0.87301587 0.88524590 0.88679245 0.83870968 0.79104478 0.81578947  
## Yes 0.12698413 0.11475410 0.11320755 0.16129032 0.20895522 0.18421053  
##   
## 1021.3 1021.35 1021.4 1021.45 1021.5 1021.55  
## No 0.88888889 0.77464789 0.87096774 0.85714286 0.86440678 0.81538462  
## Yes 0.11111111 0.22535211 0.12903226 0.14285714 0.13559322 0.18461538  
##   
## 1021.6 1021.65 1021.7 1021.75 1021.8 1021.85  
## No 0.89610390 0.84482759 0.83050847 0.89090909 0.85507246 0.85526316  
## Yes 0.10389610 0.15517241 0.16949153 0.10909091 0.14492754 0.14473684  
##   
## 1021.9 1021.95 1022 1022.05 1022.1 1022.15  
## No 0.87671233 0.79069767 0.92000000 0.91803279 0.89189189 0.86567164  
## Yes 0.12328767 0.20930233 0.08000000 0.08196721 0.10810811 0.13432836  
##   
## 1022.2 1022.25 1022.3 1022.35 1022.4 1022.45  
## No 0.81034483 0.85185185 0.80000000 0.86567164 0.87719298 0.83606557  
## Yes 0.18965517 0.14814815 0.20000000 0.13432836 0.12280702 0.16393443  
##   
## 1022.5 1022.55 1022.6 1022.65 1022.7 1022.75  
## No 0.87719298 0.82926829 0.85454545 0.85714286 0.79591837 0.80769231  
## Yes 0.12280702 0.17073171 0.14545455 0.14285714 0.20408163 0.19230769  
##   
## 1022.8 1022.85 1022.9 1022.95 1023 1023.05  
## No 0.72916667 0.88888889 0.85000000 0.92592593 0.90697674 0.91525424  
## Yes 0.27083333 0.11111111 0.15000000 0.07407407 0.09302326 0.08474576  
##   
## 1023.1 1023.15 1023.2 1023.25 1023.3 1023.35  
## No 0.80000000 0.87931034 0.83333333 0.73333333 0.85074627 0.83673469  
## Yes 0.20000000 0.12068966 0.16666667 0.26666667 0.14925373 0.16326531  
##   
## 1023.4 1023.45 1023.5 1023.55 1023.6 1023.65  
## No 0.77777778 0.89743590 0.81250000 0.78000000 0.86666667 0.88888889  
## Yes 0.22222222 0.10256410 0.18750000 0.22000000 0.13333333 0.11111111  
##   
## 1023.7 1023.75 1023.8 1023.85 1023.9 1023.95  
## No 0.86538462 0.86000000 0.94000000 0.85000000 0.82000000 0.90697674  
## Yes 0.13461538 0.14000000 0.06000000 0.15000000 0.18000000 0.09302326  
##   
## 1024 1024.05 1024.1 1024.15 1024.2 1024.25  
## No 0.82758621 0.87500000 0.83333333 0.86000000 0.88372093 0.88235294  
## Yes 0.17241379 0.12500000 0.16666667 0.14000000 0.11627907 0.11764706  
##   
## 1024.3 1024.35 1024.4 1024.45 1024.5 1024.55  
## No 0.82352941 0.72727273 0.91428571 0.93750000 0.84000000 0.83783784  
## Yes 0.17647059 0.27272727 0.08571429 0.06250000 0.16000000 0.16216216  
##   
## 1024.6 1024.65 1024.7 1024.75 1024.8 1024.85  
## No 0.85000000 0.72916667 0.82500000 0.85714286 0.80000000 0.90909091  
## Yes 0.15000000 0.27083333 0.17500000 0.14285714 0.20000000 0.09090909  
##   
## 1024.9 1024.95 1025 1025.05 1025.1 1025.15  
## No 0.89130435 1.00000000 0.87500000 0.97142857 0.90000000 0.86206897  
## Yes 0.10869565 0.00000000 0.12500000 0.02857143 0.10000000 0.13793103  
##   
## 1025.2 1025.25 1025.3 1025.35 1025.4 1025.45  
## No 0.83870968 0.89743590 0.84848485 0.81632653 0.84210526 0.84782609  
## Yes 0.16129032 0.10256410 0.15151515 0.18367347 0.15789474 0.15217391  
##   
## 1025.5 1025.55 1025.6 1025.65 1025.7 1025.75  
## No 0.91666667 0.86486486 0.81481481 0.94117647 0.96666667 0.82758621  
## Yes 0.08333333 0.13513514 0.18518519 0.05882353 0.03333333 0.17241379  
##   
## 1025.8 1025.85 1025.9 1025.95 1026 1026.05  
## No 0.88571429 0.85185185 0.90322581 0.89473684 0.91176471 0.80000000  
## Yes 0.11428571 0.14814815 0.09677419 0.10526316 0.08823529 0.20000000  
##   
## 1026.1 1026.15 1026.2 1026.25 1026.3 1026.35  
## No 0.93939394 0.90322581 0.90322581 0.76000000 0.76470588 0.88571429  
## Yes 0.06060606 0.09677419 0.09677419 0.24000000 0.23529412 0.11428571  
##   
## 1026.4 1026.45 1026.5 1026.55 1026.6 1026.65  
## No 0.91666667 0.74193548 0.85000000 0.90476190 0.92500000 0.92857143  
## Yes 0.08333333 0.25806452 0.15000000 0.09523810 0.07500000 0.07142857  
##   
## 1026.7 1026.75 1026.8 1026.85 1026.9 1026.95  
## No 0.90625000 0.87500000 0.95238095 0.93333333 0.91304348 0.93750000  
## Yes 0.09375000 0.12500000 0.04761905 0.06666667 0.08695652 0.06250000  
##   
## 1027 1027.05 1027.1 1027.15 1027.2 1027.25  
## No 0.80555556 0.72222222 0.80000000 0.93750000 1.00000000 0.95238095  
## Yes 0.19444444 0.27777778 0.20000000 0.06250000 0.00000000 0.04761905  
##   
## 1027.3 1027.35 1027.4 1027.45 1027.5 1027.55  
## No 0.90909091 0.78571429 0.96153846 0.85714286 0.91666667 0.95454545  
## Yes 0.09090909 0.21428571 0.03846154 0.14285714 0.08333333 0.04545455  
##   
## 1027.6 1027.65 1027.7 1027.75 1027.8 1027.85  
## No 0.95833333 0.86363636 0.76000000 0.95000000 0.92592593 0.86363636  
## Yes 0.04166667 0.13636364 0.24000000 0.05000000 0.07407407 0.13636364  
##   
## 1027.9 1027.95 1028 1028.05 1028.1 1028.15  
## No 0.96666667 0.83333333 0.96000000 0.89285714 0.95000000 0.83333333  
## Yes 0.03333333 0.16666667 0.04000000 0.10714286 0.05000000 0.16666667  
##   
## 1028.2 1028.25 1028.3 1028.35 1028.4 1028.45  
## No 0.85000000 0.93333333 0.95652174 0.68750000 0.90909091 0.92857143  
## Yes 0.15000000 0.06666667 0.04347826 0.31250000 0.09090909 0.07142857  
##   
## 1028.5 1028.55 1028.6 1028.65 1028.7 1028.75  
## No 1.00000000 0.90000000 0.75000000 0.88888889 0.88461538 0.96000000  
## Yes 0.00000000 0.10000000 0.25000000 0.11111111 0.11538462 0.04000000  
##   
## 1028.8 1028.85 1028.9 1028.95 1029 1029.05  
## No 0.88235294 0.82352941 1.00000000 0.71428571 0.81818182 0.85000000  
## Yes 0.11764706 0.17647059 0.00000000 0.28571429 0.18181818 0.15000000  
##   
## 1029.1 1029.15 1029.2 1029.25 1029.3 1029.35  
## No 0.84615385 0.78571429 0.78571429 0.76923077 0.72222222 0.85714286  
## Yes 0.15384615 0.21428571 0.21428571 0.23076923 0.27777778 0.14285714  
##   
## 1029.4 1029.45 1029.5 1029.55 1029.6 1029.65  
## No 1.00000000 0.86956522 0.86956522 1.00000000 1.00000000 0.87500000  
## Yes 0.00000000 0.13043478 0.13043478 0.00000000 0.00000000 0.12500000  
##   
## 1029.7 1029.75 1029.8 1029.85 1029.9 1029.95  
## No 0.83333333 0.88888889 1.00000000 0.91666667 0.85714286 0.76470588  
## Yes 0.16666667 0.11111111 0.00000000 0.08333333 0.14285714 0.23529412  
##   
## 1030 1030.05 1030.1 1030.15 1030.2 1030.25  
## No 1.00000000 1.00000000 1.00000000 0.57142857 0.80952381 0.93750000  
## Yes 0.00000000 0.00000000 0.00000000 0.42857143 0.19047619 0.06250000  
##   
## 1030.3 1030.35 1030.4 1030.45 1030.5 1030.55  
## No 0.66666667 0.92857143 0.81818182 0.88888889 0.85714286 1.00000000  
## Yes 0.33333333 0.07142857 0.18181818 0.11111111 0.14285714 0.00000000  
##   
## 1030.6 1030.65 1030.7 1030.75 1030.8 1030.85  
## No 0.85000000 0.60000000 0.93333333 0.81818182 1.00000000 1.00000000  
## Yes 0.15000000 0.40000000 0.06666667 0.18181818 0.00000000 0.00000000  
##   
## 1030.9 1030.95 1031 1031.05 1031.1 1031.15  
## No 0.83333333 0.87500000 0.85714286 0.84615385 0.85000000 0.85714286  
## Yes 0.16666667 0.12500000 0.14285714 0.15384615 0.15000000 0.14285714  
##   
## 1031.2 1031.25 1031.3 1031.35 1031.4 1031.45  
## No 0.83333333 1.00000000 1.00000000 0.76470588 0.81818182 0.66666667  
## Yes 0.16666667 0.00000000 0.00000000 0.23529412 0.18181818 0.33333333  
##   
## 1031.5 1031.55 1031.6 1031.65 1031.7 1031.75  
## No 0.75000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.25000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 1031.8 1031.85 1031.9 1031.95 1032 1032.05  
## No 0.66666667 0.75000000 0.91666667 1.00000000 0.92857143 1.00000000  
## Yes 0.33333333 0.25000000 0.08333333 0.00000000 0.07142857 0.00000000  
##   
## 1032.1 1032.15 1032.2 1032.25 1032.3 1032.35  
## No 1.00000000 1.00000000 1.00000000 0.80000000 0.83333333 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.20000000 0.16666667 0.00000000  
##   
## 1032.4 1032.45 1032.5 1032.55 1032.6 1032.65  
## No 1.00000000 1.00000000 1.00000000 1.00000000 0.57142857 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.42857143 0.00000000  
##   
## 1032.7 1032.75 1032.8 1032.85 1032.9 1032.95  
## No 1.00000000 0.85714286 0.80000000 1.00000000 0.66666667 1.00000000  
## Yes 0.00000000 0.14285714 0.20000000 0.00000000 0.33333333 0.00000000  
##   
## 1033 1033.05 1033.1 1033.15 1033.2 1033.25  
## No 0.90000000 0.83333333 1.00000000 1.00000000 0.83333333 1.00000000  
## Yes 0.10000000 0.16666667 0.00000000 0.00000000 0.16666667 0.00000000  
##   
## 1033.3 1033.4 1033.45 1033.5 1033.55 1033.6  
## No 1.00000000 1.00000000 0.75000000 1.00000000 1.00000000 0.88888889  
## Yes 0.00000000 0.00000000 0.25000000 0.00000000 0.00000000 0.11111111  
##   
## 1033.65 1033.7 1033.75 1033.8 1033.85 1033.95  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 1034 1034.05 1034.1 1034.15 1034.2 1034.25  
## No 1.00000000 1.00000000 0.80000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.20000000 0.00000000 0.00000000 0.00000000  
##   
## 1034.3 1034.35 1034.4 1034.45 1034.5 1034.55  
## No 0.75000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.25000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 1034.6 1034.65 1034.7 1034.75 1034.8 1034.85  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 0.50000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.50000000  
##   
## 1034.9 1034.95 1035 1035.05 1035.15 1035.2  
## No 1.00000000 1.00000000 1.00000000 1.00000000 0.50000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.50000000 0.00000000  
##   
## 1035.25 1035.3 1035.35 1035.4 1035.45 1035.5  
## No 1.00000000 1.00000000 1.00000000 0.50000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.50000000 0.00000000 0.00000000  
##   
## 1035.55 1035.6 1035.7 1035.85 1035.9 1035.95  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 1036 1036.05 1036.15 1036.25 1036.3 1036.35  
## No 1.00000000 0.00000000 1.00000000 1.00000000 1.00000000 0.00000000  
## Yes 0.00000000 1.00000000 0.00000000 0.00000000 0.00000000 1.00000000  
##   
## 1036.4 1036.45 1036.5 1036.6 1036.65 1036.7  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 1036.8 1036.85 1037.1 1037.2 1037.25 1037.3  
## No 1.00000000 1.00000000 0.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 1.00000000 0.00000000 0.00000000 0.00000000  
##   
## 1037.35 1037.55 1037.6 1037.65 1037.7 1037.85  
## No 1.00000000 0.00000000 0.75000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 1.00000000 0.25000000 0.00000000 0.00000000 0.00000000  
##   
## 1037.9 1037.95 1039  
## No 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000

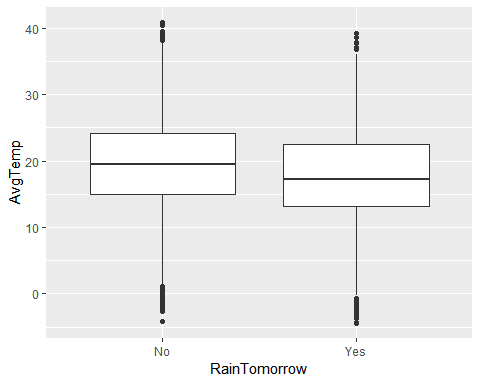
#Looking at the relationship of RainTomorrow to AvgWindSpeed  
ggplot(rain\_complete, aes(x= AvgWindSpeed, fill= RainTomorrow)) + geom\_bar()



#table view  
tb7 = table(rain\_complete$RainTomorrow, rain\_complete$AvgWindSpeed) #creates table object  
prop.table(tb7, margin = 2) #crosstab with proportions

##   
## 0 1 2 3 3.5 4  
## No 0.7115385 0.7500000 0.7368421 0.7313433 0.8441558 0.7840909  
## Yes 0.2884615 0.2500000 0.2631579 0.2686567 0.1558442 0.2159091  
##   
## 4.5 5 5.5 6 6.5 7  
## No 0.8498584 0.8189655 0.8309572 0.8070175 0.7857143 0.8553459  
## Yes 0.1501416 0.1810345 0.1690428 0.1929825 0.2142857 0.1446541  
##   
## 7.5 8 8.5 9 9.5 10  
## No 0.8283262 0.7888199 0.8291139 0.8028169 0.7888889 0.8017032  
## Yes 0.1716738 0.2111801 0.1708861 0.1971831 0.2111111 0.1982968  
##   
## 10.5 11 11.5 12 12.5 13  
## No 0.7710843 0.8164026 0.8614232 0.8024291 0.7543860 0.7973258  
## Yes 0.2289157 0.1835974 0.1385768 0.1975709 0.2456140 0.2026742  
##   
## 13.5 14 14.5 15 15.5 16  
## No 0.7947368 0.8041902 0.7619048 0.8036021 0.7946257 0.7880240  
## Yes 0.2052632 0.1958098 0.2380952 0.1963979 0.2053743 0.2119760  
##   
## 16.5 17 17.5 18 18.5 19  
## No 0.7882653 0.8018868 0.7767107 0.8166259 0.7882353 0.7860963  
## Yes 0.2117347 0.1981132 0.2232893 0.1833741 0.2117647 0.2139037  
##   
## 19.5 20 20.5 21 21.5 22  
## No 0.7858607 0.7793427 0.7929227 0.7138365 0.7614314 0.7548387  
## Yes 0.2141393 0.2206573 0.2070773 0.2861635 0.2385686 0.2451613  
##   
## 22.5 23 23.5 24 24.5 25  
## No 0.8004988 0.7546778 0.7257384 0.7089286 0.7191011 0.7332054  
## Yes 0.1995012 0.2453222 0.2742616 0.2910714 0.2808989 0.2667946  
##   
## 25.5 26 26.5 27 27.5 28  
## No 0.7962963 0.7169811 0.6800000 0.7033639 0.6531792 0.7112299  
## Yes 0.2037037 0.2830189 0.3200000 0.2966361 0.3468208 0.2887701  
##   
## 28.5 29 29.5 30 30.5 31  
## No 0.6600985 0.6044776 0.6898148 0.6166667 0.6950673 0.5500000  
## Yes 0.3399015 0.3955224 0.3101852 0.3833333 0.3049327 0.4500000  
##   
## 31.5 32 32.5 33 33.5 34  
## No 0.6643836 0.6739130 0.7016129 0.5454545 0.5967742 0.6129032  
## Yes 0.3356164 0.3260870 0.2983871 0.4545455 0.4032258 0.3870968  
##   
## 34.5 35 35.5 36 36.5 37  
## No 0.7179487 0.6093750 0.6521739 0.6575342 0.6363636 0.6142857  
## Yes 0.2820513 0.3906250 0.3478261 0.3424658 0.3636364 0.3857143  
##   
## 37.5 38 38.5 39 39.5 40  
## No 0.6250000 0.5714286 1.0000000 0.5937500 0.7500000 0.5925926  
## Yes 0.3750000 0.4285714 0.0000000 0.4062500 0.2500000 0.4074074  
##   
## 40.5 41 41.5 42 42.5 43  
## No 0.6666667 0.4705882 0.4705882 0.2222222 0.5714286 0.5714286  
## Yes 0.3333333 0.5294118 0.5294118 0.7777778 0.4285714 0.4285714  
##   
## 43.5 44 44.5 45 45.5 46  
## No 0.4285714 0.6666667 0.6428571 0.3333333 0.2222222 0.7500000  
## Yes 0.5714286 0.3333333 0.3571429 0.6666667 0.7777778 0.2500000  
##   
## 46.5 47 47.5 48 48.5 49  
## No 0.4545455 0.4285714 0.6666667 0.6666667 1.0000000 1.0000000  
## Yes 0.5454545 0.5714286 0.3333333 0.3333333 0.0000000 0.0000000  
##   
## 49.5 50 51 52 52.5 53.5  
## No 0.0000000 0.0000000 0.2500000 0.6000000 0.5000000 0.0000000  
## Yes 1.0000000 1.0000000 0.7500000 0.4000000 0.5000000 1.0000000  
##   
## 54.5 55 55.5 56.5 58.5 59  
## No 0.2500000 1.0000000 0.0000000 0.0000000 1.0000000 1.0000000  
## Yes 0.7500000 0.0000000 1.0000000 1.0000000 0.0000000 0.0000000  
##   
## 60 61.5 62 63 65 66.5  
## No 1.0000000 0.0000000 0.0000000 0.0000000 1.0000000 1.0000000  
## Yes 0.0000000 1.0000000 1.0000000 1.0000000 0.0000000 0.0000000  
##   
## 80.5  
## No 0.0000000  
## Yes 1.0000000

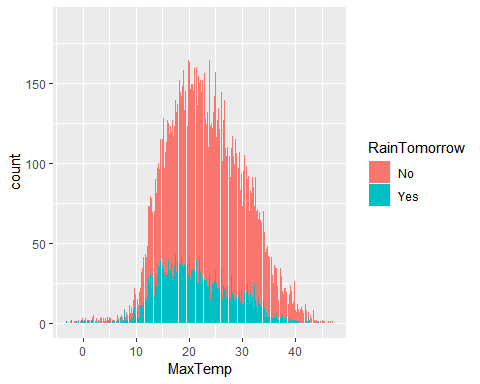
#Looking at the relationship of RainTomorrow to AvgTemp  
ggplot(rain\_complete, aes(x= RainTomorrow, y= AvgTemp)) + geom\_boxplot()



#table view  
tb8 = table(rain\_complete$RainTomorrow, rain\_complete$AvgTemp) #creates table object  
prop.table(tb8, margin = 2) #crosstab with proportions

##   
## -4.45 -4.35 -4.1 -3.75 -3.6 -3.55  
## No 0.00000000 0.00000000 1.00000000 0.00000000 0.00000000 0.00000000  
## Yes 1.00000000 1.00000000 0.00000000 1.00000000 1.00000000 1.00000000  
##   
## -3.35 -3.3 -3.15 -2.8 -2.7 -2.6  
## No 0.00000000 0.00000000 0.00000000 0.00000000 1.00000000 1.00000000  
## Yes 1.00000000 1.00000000 1.00000000 1.00000000 0.00000000 0.00000000  
##   
## -2.55 -2.5 -2.25 -2.15 -2.1 -2.05  
## No 0.00000000 0.66666667 1.00000000 1.00000000 1.00000000 0.00000000  
## Yes 1.00000000 0.33333333 0.00000000 0.00000000 0.00000000 1.00000000  
##   
## -2 -1.8 -1.75 -1.7 -1.65 -1.45  
## No 0.00000000 0.00000000 1.00000000 0.33333333 0.00000000 0.50000000  
## Yes 1.00000000 1.00000000 0.00000000 0.66666667 1.00000000 0.50000000  
##   
## -1.35 -1.25 -1.2 -1.1 -0.9 -0.8  
## No 0.00000000 0.00000000 1.00000000 0.50000000 0.00000000 1.00000000  
## Yes 1.00000000 1.00000000 0.00000000 0.50000000 1.00000000 0.00000000  
##   
## -0.75 -0.7 -0.65 -0.55 -0.5 -0.45  
## No 1.00000000 0.50000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.50000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## -0.4 -0.3 -0.25 -0.2 -0.15 -0.1  
## No 1.00000000 1.00000000 1.00000000 0.50000000 1.00000000 0.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.50000000 0.00000000 1.00000000  
##   
## -0.0999999999999999 -0.05 0.0499999999999999 0.05  
## No 1.00000000 0.50000000 1.00000000 0.50000000  
## Yes 0.00000000 0.50000000 0.00000000 0.50000000  
##   
## 0.2 0.25 0.35 0.4 0.45 0.5  
## No 0.66666667 1.00000000 1.00000000 0.60000000 1.00000000 1.00000000  
## Yes 0.33333333 0.00000000 0.00000000 0.40000000 0.00000000 0.00000000  
##   
## 0.55 0.6 0.7 0.75 0.85 0.9  
## No 0.50000000 0.66666667 0.00000000 1.00000000 0.25000000 0.00000000  
## Yes 0.50000000 0.33333333 1.00000000 0.00000000 0.75000000 1.00000000  
##   
## 0.95 1 1.05 1.1 1.15 1.2  
## No 0.50000000 1.00000000 1.00000000 0.33333333 0.50000000 0.00000000  
## Yes 0.50000000 0.00000000 0.00000000 0.66666667 0.50000000 1.00000000  
##   
## 1.3 1.35 1.4 1.45 1.5 1.6  
## No 1.00000000 0.00000000 1.00000000 1.00000000 0.80000000 1.00000000  
## Yes 0.00000000 1.00000000 0.00000000 0.00000000 0.20000000 0.00000000  
##   
## 1.7 1.75 1.8 1.85 1.95 2  
## No 0.00000000 0.33333333 1.00000000 0.00000000 1.00000000 0.66666667  
## Yes 1.00000000 0.66666667 0.00000000 1.00000000 0.00000000 0.33333333  
##   
## 2.05 2.1 2.2 2.25 2.3 2.35  
## No 1.00000000 1.00000000 1.00000000 1.00000000 0.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 1.00000000 0.00000000  
##   
## 2.55 2.65 2.7 2.75 2.8 2.85  
## No 0.50000000 1.00000000 0.66666667 1.00000000 1.00000000 1.00000000  
## Yes 0.50000000 0.00000000 0.33333333 0.00000000 0.00000000 0.00000000  
##   
## 2.9 3 3.1 3.15 3.25 3.3  
## No 1.00000000 1.00000000 0.50000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.50000000 0.00000000 0.00000000 0.00000000  
##   
## 3.35 3.5 3.55 3.65 3.75 3.8  
## No 0.50000000 0.80000000 0.50000000 1.00000000 0.33333333 0.00000000  
## Yes 0.50000000 0.20000000 0.50000000 0.00000000 0.66666667 1.00000000  
##   
## 3.85 3.9 3.95 4 4.1 4.15  
## No 0.00000000 0.50000000 1.00000000 1.00000000 1.00000000 0.50000000  
## Yes 1.00000000 0.50000000 0.00000000 0.00000000 0.00000000 0.50000000  
##   
## 4.2 4.25 4.3 4.35 4.45 4.5  
## No 0.00000000 1.00000000 1.00000000 1.00000000 0.50000000 1.00000000  
## Yes 1.00000000 0.00000000 0.00000000 0.00000000 0.50000000 0.00000000  
##   
## 4.55 4.6 4.65 4.7 4.75 4.8  
## No 0.66666667 1.00000000 1.00000000 0.50000000 1.00000000 1.00000000  
## Yes 0.33333333 0.00000000 0.00000000 0.50000000 0.00000000 0.00000000  
##   
## 4.85 4.9 5 5.05 5.1 5.15  
## No 1.00000000 1.00000000 0.66666667 0.60000000 0.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.33333333 0.40000000 1.00000000 0.00000000  
##   
## 5.2 5.25 5.3 5.35 5.45 5.5  
## No 0.66666667 0.50000000 0.33333333 0.50000000 0.80000000 0.00000000  
## Yes 0.33333333 0.50000000 0.66666667 0.50000000 0.20000000 1.00000000  
##   
## 5.55 5.6 5.65 5.7 5.75 5.8  
## No 0.60000000 0.00000000 1.00000000 0.57142857 0.66666667 0.85714286  
## Yes 0.40000000 1.00000000 0.00000000 0.42857143 0.33333333 0.14285714  
##   
## 5.85 5.9 5.95 6 6.05 6.1  
## No 1.00000000 0.75000000 1.00000000 0.00000000 0.44444444 1.00000000  
## Yes 0.00000000 0.25000000 0.00000000 1.00000000 0.55555556 0.00000000  
##   
## 6.15 6.2 6.25 6.3 6.35 6.4  
## No 0.55555556 0.60000000 1.00000000 0.55555556 0.70000000 0.75000000  
## Yes 0.44444444 0.40000000 0.00000000 0.44444444 0.30000000 0.25000000  
##   
## 6.45 6.5 6.55 6.6 6.65 6.7  
## No 0.77777778 0.70000000 0.00000000 0.66666667 0.91666667 0.90000000  
## Yes 0.22222222 0.30000000 1.00000000 0.33333333 0.08333333 0.10000000  
##   
## 6.75 6.8 6.85 6.9 6.95 7  
## No 0.66666667 0.75000000 0.57142857 0.72727273 0.77777778 0.66666667  
## Yes 0.33333333 0.25000000 0.42857143 0.27272727 0.22222222 0.33333333  
##   
## 7.05 7.1 7.15 7.2 7.25 7.3  
## No 0.66666667 0.75000000 0.54545455 0.72222222 0.75000000 0.70000000  
## Yes 0.33333333 0.25000000 0.45454545 0.27777778 0.25000000 0.30000000  
##   
## 7.35 7.4 7.45 7.5 7.55 7.6  
## No 0.45454545 0.90000000 0.68750000 0.81250000 0.69230769 0.61538462  
## Yes 0.54545455 0.10000000 0.31250000 0.18750000 0.30769231 0.38461538  
##   
## 7.65 7.7 7.75 7.8 7.85 7.9  
## No 0.93750000 0.74074074 0.78571429 0.75000000 0.80952381 1.00000000  
## Yes 0.06250000 0.25925926 0.21428571 0.25000000 0.19047619 0.00000000  
##   
## 7.95 8 8.05 8.1 8.15 8.2  
## No 0.72222222 0.61538462 0.75000000 0.86666667 0.80000000 0.71428571  
## Yes 0.27777778 0.38461538 0.25000000 0.13333333 0.20000000 0.28571429  
##   
## 8.25 8.3 8.35 8.4 8.45 8.5  
## No 0.66666667 0.65217391 0.55000000 0.58333333 0.63157895 0.84000000  
## Yes 0.33333333 0.34782609 0.45000000 0.41666667 0.36842105 0.16000000  
##   
## 8.55 8.6 8.65 8.7 8.75 8.8  
## No 0.52631579 0.83333333 0.70370370 0.76470588 0.55000000 0.68965517  
## Yes 0.47368421 0.16666667 0.29629630 0.23529412 0.45000000 0.31034483  
##   
## 8.85 8.9 8.95 9 9.05 9.1  
## No 0.69230769 0.82352941 0.71428571 0.66666667 0.78260870 0.61538462  
## Yes 0.30769231 0.17647059 0.28571429 0.33333333 0.21739130 0.38461538  
##   
## 9.15 9.2 9.25 9.3 9.35 9.4  
## No 0.69230769 0.70833333 0.62068966 0.57142857 0.63333333 0.77777778  
## Yes 0.30769231 0.29166667 0.37931034 0.42857143 0.36666667 0.22222222  
##   
## 9.45 9.5 9.55 9.6 9.65 9.7  
## No 0.79166667 0.72413793 0.75000000 0.57142857 0.70000000 0.70967742  
## Yes 0.20833333 0.27586207 0.25000000 0.42857143 0.30000000 0.29032258  
##   
## 9.75 9.8 9.85 9.9 9.95 10  
## No 0.64285714 0.70370370 0.75862069 0.75000000 0.75000000 0.68571429  
## Yes 0.35714286 0.29629630 0.24137931 0.25000000 0.25000000 0.31428571  
##   
## 10.05 10.1 10.15 10.2 10.25 10.3  
## No 0.65853659 0.63333333 0.65625000 0.69444444 0.65000000 0.48571429  
## Yes 0.34146341 0.36666667 0.34375000 0.30555556 0.35000000 0.51428571  
##   
## 10.35 10.4 10.45 10.5 10.55 10.6  
## No 0.70270270 0.75000000 0.67441860 0.73469388 0.65306122 0.73469388  
## Yes 0.29729730 0.25000000 0.32558140 0.26530612 0.34693878 0.26530612  
##   
## 10.65 10.7 10.75 10.8 10.85 10.9  
## No 0.64444444 0.83333333 0.67391304 0.74509804 0.66071429 0.72972973  
## Yes 0.35555556 0.16666667 0.32608696 0.25490196 0.33928571 0.27027027  
##   
## 10.95 11 11.05 11.1 11.15 11.2  
## No 0.63414634 0.55319149 0.80000000 0.69811321 0.73469388 0.66037736  
## Yes 0.36585366 0.44680851 0.20000000 0.30188679 0.26530612 0.33962264  
##   
## 11.25 11.3 11.35 11.4 11.45 11.5  
## No 0.76744186 0.64912281 0.65517241 0.64516129 0.71698113 0.68888889  
## Yes 0.23255814 0.35087719 0.34482759 0.35483871 0.28301887 0.31111111  
##   
## 11.55 11.6 11.65 11.7 11.75 11.8  
## No 0.76086957 0.67647059 0.67187500 0.69230769 0.75925926 0.71153846  
## Yes 0.23913043 0.32352941 0.32812500 0.30769231 0.24074074 0.28846154  
##   
## 11.85 11.9 11.95 12 12.05 12.1  
## No 0.67272727 0.76562500 0.58461538 0.59375000 0.64150943 0.68918919  
## Yes 0.32727273 0.23437500 0.41538462 0.40625000 0.35849057 0.31081081  
##   
## 12.15 12.2 12.25 12.3 12.35 12.4  
## No 0.67948718 0.71929825 0.66666667 0.63333333 0.75000000 0.73913043  
## Yes 0.32051282 0.28070175 0.33333333 0.36666667 0.25000000 0.26086957  
##   
## 12.45 12.5 12.55 12.6 12.65 12.7  
## No 0.73333333 0.64062500 0.72058824 0.73015873 0.65454545 0.74666667  
## Yes 0.26666667 0.35937500 0.27941176 0.26984127 0.34545455 0.25333333  
##   
## 12.75 12.8 12.85 12.9 12.95 13  
## No 0.68656716 0.68831169 0.70370370 0.75280899 0.72602740 0.69841270  
## Yes 0.31343284 0.31168831 0.29629630 0.24719101 0.27397260 0.30158730  
##   
## 13.05 13.1 13.15 13.2 13.25 13.3  
## No 0.69014085 0.81578947 0.81250000 0.77777778 0.60869565 0.63461538  
## Yes 0.30985915 0.18421053 0.18750000 0.22222222 0.39130435 0.36538462  
##   
## 13.35 13.4 13.45 13.5 13.55 13.6  
## No 0.68421053 0.72058824 0.77777778 0.76119403 0.80519481 0.70588235  
## Yes 0.31578947 0.27941176 0.22222222 0.23880597 0.19480519 0.29411765  
##   
## 13.65 13.7 13.75 13.8 13.85 13.9  
## No 0.77027027 0.74285714 0.74324324 0.69117647 0.80952381 0.89473684  
## Yes 0.22972973 0.25714286 0.25675676 0.30882353 0.19047619 0.10526316  
##   
## 13.95 14 14.05 14.1 14.15 14.2  
## No 0.70967742 0.70731707 0.79687500 0.71014493 0.69841270 0.71186441  
## Yes 0.29032258 0.29268293 0.20312500 0.28985507 0.30158730 0.28813559  
##   
## 14.25 14.3 14.35 14.4 14.45 14.5  
## No 0.73913043 0.71014493 0.74324324 0.69333333 0.71084337 0.73118280  
## Yes 0.26086957 0.28985507 0.25675676 0.30666667 0.28915663 0.26881720  
##   
## 14.55 14.6 14.65 14.7 14.75 14.8  
## No 0.75362319 0.65714286 0.69230769 0.77611940 0.61538462 0.77049180  
## Yes 0.24637681 0.34285714 0.30769231 0.22388060 0.38461538 0.22950820  
##   
## 14.85 14.9 14.95 15 15.05 15.1  
## No 0.82812500 0.74117647 0.72289157 0.68367347 0.65753425 0.76470588  
## Yes 0.17187500 0.25882353 0.27710843 0.31632653 0.34246575 0.23529412  
##   
## 15.15 15.2 15.25 15.3 15.35 15.4  
## No 0.75000000 0.74324324 0.78873239 0.75000000 0.73417722 0.79310345  
## Yes 0.25000000 0.25675676 0.21126761 0.25000000 0.26582278 0.20689655  
##   
## 15.45 15.5 15.55 15.6 15.65 15.7  
## No 0.70588235 0.69863014 0.74647887 0.75000000 0.76543210 0.80769231  
## Yes 0.29411765 0.30136986 0.25352113 0.25000000 0.23456790 0.19230769  
##   
## 15.75 15.8 15.85 15.9 15.95 16  
## No 0.69863014 0.71052632 0.71590909 0.82191781 0.79746835 0.84523810  
## Yes 0.30136986 0.28947368 0.28409091 0.17808219 0.20253165 0.15476190  
##   
## 16.05 16.1 16.15 16.2 16.25 16.3  
## No 0.74074074 0.77142857 0.72448980 0.76056338 0.78205128 0.80952381  
## Yes 0.25925926 0.22857143 0.27551020 0.23943662 0.21794872 0.19047619  
##   
## 16.35 16.4 16.45 16.5 16.55 16.6  
## No 0.79245283 0.74468085 0.73809524 0.73563218 0.77272727 0.74358974  
## Yes 0.20754717 0.25531915 0.26190476 0.26436782 0.22727273 0.25641026  
##   
## 16.65 16.7 16.75 16.8 16.85 16.9  
## No 0.74324324 0.63235294 0.70833333 0.75641026 0.81944444 0.71250000  
## Yes 0.25675676 0.36764706 0.29166667 0.24358974 0.18055556 0.28750000  
##   
## 16.95 17 17.05 17.1 17.15 17.2  
## No 0.72307692 0.75000000 0.72631579 0.83870968 0.80952381 0.70000000  
## Yes 0.27692308 0.25000000 0.27368421 0.16129032 0.19047619 0.30000000  
##   
## 17.25 17.3 17.35 17.4 17.45 17.5  
## No 0.82222222 0.75949367 0.79166667 0.76923077 0.77941176 0.78313253  
## Yes 0.17777778 0.24050633 0.20833333 0.23076923 0.22058824 0.21686747  
##   
## 17.55 17.6 17.65 17.7 17.75 17.8  
## No 0.85714286 0.85714286 0.77319588 0.78313253 0.74025974 0.73972603  
## Yes 0.14285714 0.14285714 0.22680412 0.21686747 0.25974026 0.26027397  
##   
## 17.85 17.9 17.95 18 18.05 18.1  
## No 0.81578947 0.75000000 0.70769231 0.75000000 0.80459770 0.79746835  
## Yes 0.18421053 0.25000000 0.29230769 0.25000000 0.19540230 0.20253165  
##   
## 18.15 18.2 18.25 18.3 18.35 18.4  
## No 0.84285714 0.75308642 0.71212121 0.75675676 0.77922078 0.80821918  
## Yes 0.15714286 0.24691358 0.28787879 0.24324324 0.22077922 0.19178082  
##   
## 18.45 18.5 18.55 18.6 18.65 18.7  
## No 0.82954545 0.79310345 0.84415584 0.82926829 0.75362319 0.73033708  
## Yes 0.17045455 0.20689655 0.15584416 0.17073171 0.24637681 0.26966292  
##   
## 18.75 18.8 18.85 18.9 18.95 19  
## No 0.73972603 0.80232558 0.77272727 0.74117647 0.75675676 0.76470588  
## Yes 0.26027397 0.19767442 0.22727273 0.25882353 0.24324324 0.23529412  
##   
## 19.05 19.1 19.15 19.2 19.25 19.3  
## No 0.79310345 0.77333333 0.90789474 0.77647059 0.75728155 0.82352941  
## Yes 0.20689655 0.22666667 0.09210526 0.22352941 0.24271845 0.17647059  
##   
## 19.35 19.4 19.45 19.5 19.55 19.6  
## No 0.74712644 0.80769231 0.84615385 0.80882353 0.76712329 0.76086957  
## Yes 0.25287356 0.19230769 0.15384615 0.19117647 0.23287671 0.23913043  
##   
## 19.65 19.7 19.75 19.8 19.85 19.9  
## No 0.84615385 0.79220779 0.77631579 0.74074074 0.81159420 0.84000000  
## Yes 0.15384615 0.20779221 0.22368421 0.25925926 0.18840580 0.16000000  
##   
## 19.95 20 20.05 20.1 20.15 20.2  
## No 0.80000000 0.83333333 0.75000000 0.80246914 0.87301587 0.79411765  
## Yes 0.20000000 0.16666667 0.25000000 0.19753086 0.12698413 0.20588235  
##   
## 20.25 20.3 20.35 20.4 20.45 20.5  
## No 0.85333333 0.77215190 0.78082192 0.80769231 0.75714286 0.76699029  
## Yes 0.14666667 0.22784810 0.21917808 0.19230769 0.24285714 0.23300971  
##   
## 20.55 20.6 20.65 20.7 20.75 20.8  
## No 0.82857143 0.80645161 0.82432432 0.86206897 0.84507042 0.83809524  
## Yes 0.17142857 0.19354839 0.17567568 0.13793103 0.15492958 0.16190476  
##   
## 20.85 20.9 20.95 21 21.05 21.1  
## No 0.85507246 0.86666667 0.74193548 0.86419753 0.82894737 0.78378378  
## Yes 0.14492754 0.13333333 0.25806452 0.13580247 0.17105263 0.21621622  
##   
## 21.15 21.2 21.25 21.3 21.35 21.4  
## No 0.83823529 0.80487805 0.78787879 0.80952381 0.83823529 0.79452055  
## Yes 0.16176471 0.19512195 0.21212121 0.19047619 0.16176471 0.20547945  
##   
## 21.45 21.5 21.55 21.6 21.65 21.7  
## No 0.75384615 0.85135135 0.77142857 0.86842105 0.68656716 0.87234043  
## Yes 0.24615385 0.14864865 0.22857143 0.13157895 0.31343284 0.12765957  
##   
## 21.75 21.8 21.85 21.9 21.95 22  
## No 0.83076923 0.75000000 0.81967213 0.85507246 0.78205128 0.74576271  
## Yes 0.16923077 0.25000000 0.18032787 0.14492754 0.21794872 0.25423729  
##   
## 22.05 22.1 22.15 22.2 22.25 22.3  
## No 0.80000000 0.81355932 0.75806452 0.83333333 0.82432432 0.86206897  
## Yes 0.20000000 0.18644068 0.24193548 0.16666667 0.17567568 0.13793103  
##   
## 22.35 22.4 22.45 22.5 22.55 22.6  
## No 0.86111111 0.83333333 0.84210526 0.68604651 0.79166667 0.78181818  
## Yes 0.13888889 0.16666667 0.15789474 0.31395349 0.20833333 0.21818182  
##   
## 22.65 22.7 22.75 22.8 22.85 22.9  
## No 0.79710145 0.86250000 0.81690141 0.80597015 0.87692308 0.78461538  
## Yes 0.20289855 0.13750000 0.18309859 0.19402985 0.12307692 0.21538462  
##   
## 22.95 23 23.05 23.1 23.15 23.2  
## No 0.81428571 0.79166667 0.80555556 0.86567164 0.94029851 0.73770492  
## Yes 0.18571429 0.20833333 0.19444444 0.13432836 0.05970149 0.26229508  
##   
## 23.25 23.3 23.35 23.4 23.45 23.5  
## No 0.78260870 0.85365854 0.75384615 0.76785714 0.79452055 0.81159420  
## Yes 0.21739130 0.14634146 0.24615385 0.23214286 0.20547945 0.18840580  
##   
## 23.55 23.6 23.65 23.7 23.75 23.8  
## No 0.76470588 0.83050847 0.78125000 0.77333333 0.81333333 0.77049180  
## Yes 0.23529412 0.16949153 0.21875000 0.22666667 0.18666667 0.22950820  
##   
## 23.85 23.9 23.95 24 24.05 24.1  
## No 0.82352941 0.86000000 0.81034483 0.88461538 0.81428571 0.81538462  
## Yes 0.17647059 0.14000000 0.18965517 0.11538462 0.18571429 0.18461538  
##   
## 24.15 24.2 24.25 24.3 24.35 24.4  
## No 0.74647887 0.86956522 0.87037037 0.82812500 0.80882353 0.78688525  
## Yes 0.25352113 0.13043478 0.12962963 0.17187500 0.19117647 0.21311475  
##   
## 24.45 24.5 24.55 24.6 24.65 24.7  
## No 0.88888889 0.83333333 0.85074627 0.81159420 0.75862069 0.82978723  
## Yes 0.11111111 0.16666667 0.14925373 0.18840580 0.24137931 0.17021277  
##   
## 24.75 24.8 24.85 24.9 24.95 25  
## No 0.83870968 0.84210526 0.93181818 0.85714286 0.80851064 0.84482759  
## Yes 0.16129032 0.15789474 0.06818182 0.14285714 0.19148936 0.15517241  
##   
## 25.05 25.1 25.15 25.2 25.25 25.3  
## No 0.80952381 0.89473684 0.81632653 0.79591837 0.76190476 0.84090909  
## Yes 0.19047619 0.10526316 0.18367347 0.20408163 0.23809524 0.15909091  
##   
## 25.35 25.4 25.45 25.5 25.55 25.6  
## No 0.95348837 0.88461538 0.88095238 0.86956522 0.72916667 0.75510204  
## Yes 0.04651163 0.11538462 0.11904762 0.13043478 0.27083333 0.24489796  
##   
## 25.65 25.7 25.75 25.8 25.85 25.9  
## No 0.75555556 0.89285714 0.82000000 0.84313725 0.85106383 0.84745763  
## Yes 0.24444444 0.10714286 0.18000000 0.15686275 0.14893617 0.15254237  
##   
## 25.95 26 26.05 26.1 26.15 26.2  
## No 0.87755102 0.82692308 0.71739130 0.91379310 0.87500000 0.76000000  
## Yes 0.12244898 0.17307692 0.28260870 0.08620690 0.12500000 0.24000000  
##   
## 26.25 26.3 26.35 26.4 26.45 26.5  
## No 0.82222222 0.77272727 0.80952381 0.84210526 0.82926829 0.78947368  
## Yes 0.17777778 0.22727273 0.19047619 0.15789474 0.17073171 0.21052632  
##   
## 26.55 26.6 26.65 26.7 26.75 26.8  
## No 0.85365854 0.82978723 0.93333333 0.83673469 0.80434783 0.79591837  
## Yes 0.14634146 0.17021277 0.06666667 0.16326531 0.19565217 0.20408163  
##   
## 26.85 26.9 26.95 27 27.05 27.1  
## No 0.74074074 0.85714286 0.85365854 0.88679245 0.82000000 0.83870968  
## Yes 0.25925926 0.14285714 0.14634146 0.11320755 0.18000000 0.16129032  
##   
## 27.15 27.2 27.25 27.3 27.35 27.4  
## No 0.75555556 0.92307692 0.76923077 0.90909091 0.84615385 0.81250000  
## Yes 0.24444444 0.07692308 0.23076923 0.09090909 0.15384615 0.18750000  
##   
## 27.45 27.5 27.55 27.6 27.65 27.7  
## No 0.86111111 0.89189189 0.83333333 0.77272727 0.71794872 0.77777778  
## Yes 0.13888889 0.10810811 0.16666667 0.22727273 0.28205128 0.22222222  
##   
## 27.75 27.8 27.85 27.9 27.95 28  
## No 0.86111111 0.81818182 0.78947368 0.82051282 0.87500000 0.73913043  
## Yes 0.13888889 0.18181818 0.21052632 0.17948718 0.12500000 0.26086957  
##   
## 28.05 28.1 28.15 28.2 28.25 28.3  
## No 0.80487805 0.77419355 0.75000000 0.89130435 0.75000000 0.71794872  
## Yes 0.19512195 0.22580645 0.25000000 0.10869565 0.25000000 0.28205128  
##   
## 28.35 28.4 28.45 28.5 28.55 28.6  
## No 0.83870968 0.85294118 0.85294118 0.89285714 0.82758621 0.84848485  
## Yes 0.16129032 0.14705882 0.14705882 0.10714286 0.17241379 0.15151515  
##   
## 28.65 28.7 28.75 28.8 28.85 28.9  
## No 0.94285714 0.87179487 0.84375000 0.92500000 0.76666667 0.70000000  
## Yes 0.05714286 0.12820513 0.15625000 0.07500000 0.23333333 0.30000000  
##   
## 28.95 29 29.05 29.1 29.15 29.2  
## No 0.90322581 0.68965517 0.80000000 0.71875000 0.84210526 0.65625000  
## Yes 0.09677419 0.31034483 0.20000000 0.28125000 0.15789474 0.34375000  
##   
## 29.25 29.3 29.35 29.4 29.45 29.5  
## No 0.79487179 0.85185185 0.75000000 0.78947368 0.71875000 0.75757576  
## Yes 0.20512821 0.14814815 0.25000000 0.21052632 0.28125000 0.24242424  
##   
## 29.55 29.6 29.65 29.7 29.75 29.8  
## No 0.91666667 0.87096774 0.76923077 0.76470588 0.80645161 0.78571429  
## Yes 0.08333333 0.12903226 0.23076923 0.23529412 0.19354839 0.21428571  
##   
## 29.85 29.9 29.95 30 30.05 30.1  
## No 0.81250000 0.78125000 0.82758621 0.74074074 0.75000000 0.79310345  
## Yes 0.18750000 0.21875000 0.17241379 0.25925926 0.25000000 0.20689655  
##   
## 30.15 30.2 30.25 30.3 30.35 30.4  
## No 0.75862069 0.74193548 0.73684211 0.86666667 0.85185185 0.82758621  
## Yes 0.24137931 0.25806452 0.26315789 0.13333333 0.14814815 0.17241379  
##   
## 30.45 30.5 30.55 30.6 30.65 30.7  
## No 0.84000000 0.94444444 1.00000000 0.87500000 0.85185185 0.76666667  
## Yes 0.16000000 0.05555556 0.00000000 0.12500000 0.14814815 0.23333333  
##   
## 30.75 30.8 30.85 30.9 30.95 31  
## No 0.77777778 0.78571429 0.92857143 0.85000000 0.85294118 0.73913043  
## Yes 0.22222222 0.21428571 0.07142857 0.15000000 0.14705882 0.26086957  
##   
## 31.05 31.1 31.15 31.2 31.25 31.3  
## No 0.70833333 0.64705882 0.90476190 0.70000000 0.91666667 0.93333333  
## Yes 0.29166667 0.35294118 0.09523810 0.30000000 0.08333333 0.06666667  
##   
## 31.35 31.4 31.45 31.5 31.55 31.6  
## No 0.53333333 0.84210526 0.63636364 0.79166667 0.84210526 0.88888889  
## Yes 0.46666667 0.15789474 0.36363636 0.20833333 0.15789474 0.11111111  
##   
## 31.65 31.7 31.75 31.8 31.85 31.9  
## No 0.78571429 0.88888889 0.75000000 0.92307692 0.90000000 0.92857143  
## Yes 0.21428571 0.11111111 0.25000000 0.07692308 0.10000000 0.07142857  
##   
## 31.95 32 32.05 32.1 32.15 32.2  
## No 0.81818182 0.83333333 1.00000000 0.93333333 0.86666667 0.83333333  
## Yes 0.18181818 0.16666667 0.00000000 0.06666667 0.13333333 0.16666667  
##   
## 32.25 32.3 32.35 32.4 32.45 32.5  
## No 0.76923077 0.71428571 1.00000000 0.92857143 0.71428571 1.00000000  
## Yes 0.23076923 0.28571429 0.00000000 0.07142857 0.28571429 0.00000000  
##   
## 32.55 32.6 32.65 32.7 32.75 32.8  
## No 0.91666667 0.89473684 0.75000000 0.92307692 0.92307692 1.00000000  
## Yes 0.08333333 0.10526316 0.25000000 0.07692308 0.07692308 0.00000000  
##   
## 32.85 32.9 32.95 33 33.05 33.1  
## No 1.00000000 1.00000000 0.92857143 0.84615385 0.83333333 0.93750000  
## Yes 0.00000000 0.00000000 0.07142857 0.15384615 0.16666667 0.06250000  
##   
## 33.15 33.2 33.25 33.3 33.35 33.4  
## No 0.83333333 1.00000000 0.90000000 0.80000000 1.00000000 0.90909091  
## Yes 0.16666667 0.00000000 0.10000000 0.20000000 0.00000000 0.09090909  
##   
## 33.45 33.5 33.55 33.6 33.65 33.7  
## No 1.00000000 0.83333333 0.80000000 0.88888889 0.85714286 0.75000000  
## Yes 0.00000000 0.16666667 0.20000000 0.11111111 0.14285714 0.25000000  
##   
## 33.75 33.8 33.85 33.9 33.95 34  
## No 1.00000000 1.00000000 1.00000000 0.80000000 0.77777778 0.66666667  
## Yes 0.00000000 0.00000000 0.00000000 0.20000000 0.22222222 0.33333333  
##   
## 34.05 34.1 34.15 34.2 34.25 34.3  
## No 0.80000000 0.85714286 1.00000000 1.00000000 1.00000000 0.87500000  
## Yes 0.20000000 0.14285714 0.00000000 0.00000000 0.00000000 0.12500000  
##   
## 34.35 34.4 34.45 34.5 34.55 34.6  
## No 0.83333333 0.00000000 1.00000000 0.57142857 1.00000000 0.50000000  
## Yes 0.16666667 1.00000000 0.00000000 0.42857143 0.00000000 0.50000000  
##   
## 34.65 34.7 34.75 34.8 34.9 34.95  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 35 35.05 35.1 35.15 35.2 35.25  
## No 1.00000000 1.00000000 0.75000000 1.00000000 0.80000000 1.00000000  
## Yes 0.00000000 0.00000000 0.25000000 0.00000000 0.20000000 0.00000000  
##   
## 35.3 35.35 35.4 35.45 35.5 35.55  
## No 1.00000000 0.66666667 0.83333333 0.66666667 0.75000000 1.00000000  
## Yes 0.00000000 0.33333333 0.16666667 0.33333333 0.25000000 0.00000000  
##   
## 35.6 35.65 35.7 35.75 35.8 35.85  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 35.9 35.95 36 36.05 36.15 36.2  
## No 0.83333333 1.00000000 1.00000000 0.87500000 1.00000000 1.00000000  
## Yes 0.16666667 0.00000000 0.00000000 0.12500000 0.00000000 0.00000000  
##   
## 36.25 36.3 36.35 36.4 36.45 36.5  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 36.55 36.65 36.75 36.8 36.95 37  
## No 1.00000000 1.00000000 0.75000000 1.00000000 1.00000000 0.50000000  
## Yes 0.00000000 0.00000000 0.25000000 0.00000000 0.00000000 0.50000000  
##   
## 37.05 37.1 37.15 37.2 37.25 37.4  
## No 0.66666667 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.33333333 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 37.45 37.5 37.65 37.75 37.85 38  
## No 1.00000000 1.00000000 0.50000000 1.00000000 0.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.50000000 0.00000000 1.00000000 0.00000000  
##   
## 38.1 38.15 38.2 38.25 38.3 38.35  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 38.4 38.55 38.65 38.7 38.8 38.85  
## No 1.00000000 0.66666667 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.33333333 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 38.9 38.95 39.1 39.15 39.25 39.55  
## No 1.00000000 1.00000000 1.00000000 1.00000000 0.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 1.00000000 0.00000000  
##   
## 40.45 40.75 40.9  
## No 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000

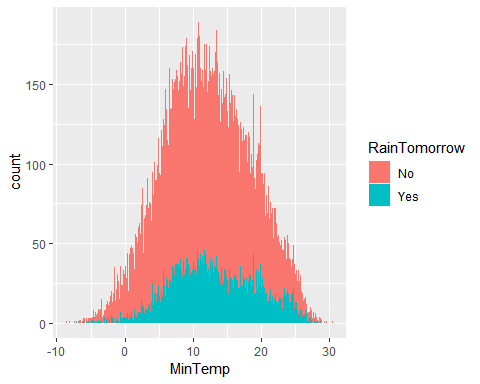
#Looking at the relationship of RainTomorrow to MaxTemp \*\*  
ggplot(rain\_complete, aes(x= MaxTemp, fill= RainTomorrow)) + geom\_bar()



#table view  
tb9 = table(rain\_complete$RainTomorrow, rain\_complete$MaxTemp) #creates table object  
prop.table(tb9, margin = 2) #crosstab with proportions

##   
## -3 -2.9 -2.5 -2.3 -2.2 -2.1  
## No 0.00000000 0.00000000 0.00000000 1.00000000 0.00000000 0.00000000  
## Yes 1.00000000 1.00000000 1.00000000 0.00000000 1.00000000 1.00000000  
##   
## -1.5 -1.4 -1.3 -1.2 -1.1 -1  
## No 1.00000000 0.50000000 0.00000000 0.00000000 0.00000000 0.00000000  
## Yes 0.00000000 0.50000000 1.00000000 1.00000000 1.00000000 1.00000000  
##   
## -0.9 -0.8 -0.7 -0.5 -0.4 -0.3  
## No 0.00000000 0.50000000 0.00000000 0.00000000 1.00000000 0.50000000  
## Yes 1.00000000 0.50000000 1.00000000 1.00000000 0.00000000 0.50000000  
##   
## -0.2 -0.1 0 0.1 0.2 0.3  
## No 0.00000000 0.00000000 0.33333333 0.00000000 1.00000000 0.50000000  
## Yes 1.00000000 1.00000000 0.66666667 1.00000000 0.00000000 0.50000000  
##   
## 0.4 0.6 0.8 0.9 1 1.1  
## No 0.50000000 0.66666667 0.50000000 0.00000000 1.00000000 0.50000000  
## Yes 0.50000000 0.33333333 0.50000000 1.00000000 0.00000000 0.50000000  
##   
## 1.2 1.3 1.4 1.6 1.7 1.9  
## No 1.00000000 0.50000000 0.50000000 0.00000000 0.00000000 0.50000000  
## Yes 0.00000000 0.50000000 0.50000000 1.00000000 1.00000000 0.50000000  
##   
## 2 2.1 2.2 2.3 2.4 2.5  
## No 1.00000000 1.00000000 0.50000000 1.00000000 1.00000000 0.75000000  
## Yes 0.00000000 0.00000000 0.50000000 0.00000000 0.00000000 0.25000000  
##   
## 2.6 2.7 2.9 3 3.1 3.2  
## No 0.66666667 0.66666667 1.00000000 0.50000000 0.50000000 1.00000000  
## Yes 0.33333333 0.33333333 0.00000000 0.50000000 0.50000000 0.00000000  
##   
## 3.3 3.4 3.5 3.6 3.7 3.8  
## No 1.00000000 1.00000000 0.33333333 0.66666667 1.00000000 0.57142857  
## Yes 0.00000000 0.00000000 0.66666667 0.33333333 0.00000000 0.42857143  
##   
## 3.9 4 4.1 4.2 4.3 4.4  
## No 0.66666667 0.66666667 1.00000000 0.00000000 1.00000000 1.00000000  
## Yes 0.33333333 0.33333333 0.00000000 1.00000000 0.00000000 0.00000000  
##   
## 4.5 4.7 4.8 4.9 5 5.1  
## No 1.00000000 0.50000000 0.50000000 1.00000000 0.00000000 0.75000000  
## Yes 0.00000000 0.50000000 0.50000000 0.00000000 1.00000000 0.25000000  
##   
## 5.2 5.3 5.4 5.6 5.7 5.8  
## No 0.71428571 0.66666667 1.00000000 0.50000000 1.00000000 1.00000000  
## Yes 0.28571429 0.33333333 0.00000000 0.50000000 0.00000000 0.00000000  
##   
## 5.9 6 6.1 6.3 6.4 6.5  
## No 1.00000000 0.50000000 1.00000000 0.66666667 1.00000000 1.00000000  
## Yes 0.00000000 0.50000000 0.00000000 0.33333333 0.00000000 0.00000000  
##   
## 6.6 6.8 6.9 7 7.1 7.2  
## No 0.60000000 0.33333333 1.00000000 0.00000000 0.25000000 0.50000000  
## Yes 0.40000000 0.66666667 0.00000000 1.00000000 0.75000000 0.50000000  
##   
## 7.3 7.4 7.5 7.6 7.7 7.8  
## No 0.80000000 1.00000000 0.75000000 0.50000000 0.50000000 0.42857143  
## Yes 0.20000000 0.00000000 0.25000000 0.50000000 0.50000000 0.57142857  
##   
## 7.9 8 8.1 8.2 8.3 8.4  
## No 0.11111111 1.00000000 0.50000000 0.75000000 0.71428571 0.50000000  
## Yes 0.88888889 0.00000000 0.50000000 0.25000000 0.28571429 0.50000000  
##   
## 8.5 8.6 8.7 8.8 8.9 9  
## No 0.60000000 0.33333333 0.50000000 0.54545455 0.71428571 0.83333333  
## Yes 0.40000000 0.66666667 0.50000000 0.45454545 0.28571429 0.16666667  
##   
## 9.1 9.2 9.3 9.4 9.5 9.6  
## No 0.70000000 0.60000000 0.41666667 0.50000000 0.16666667 0.42857143  
## Yes 0.30000000 0.40000000 0.58333333 0.50000000 0.83333333 0.57142857  
##   
## 9.7 9.8 9.9 10 10.1 10.2  
## No 0.38461538 0.54545455 0.61538462 0.72222222 0.57894737 0.60000000  
## Yes 0.61538462 0.45454545 0.38461538 0.27777778 0.42105263 0.40000000  
##   
## 10.3 10.4 10.5 10.6 10.7 10.8  
## No 0.53333333 0.58333333 0.72727273 0.61111111 0.84210526 0.56521739  
## Yes 0.46666667 0.41666667 0.27272727 0.38888889 0.15789474 0.43478261  
##   
## 10.9 11 11.1 11.2 11.3 11.4  
## No 0.50000000 0.61904762 0.65625000 0.65517241 0.70588235 0.52941176  
## Yes 0.50000000 0.38095238 0.34375000 0.34482759 0.29411765 0.47058824  
##   
## 11.5 11.6 11.7 11.8 11.9 12  
## No 0.68292683 0.45000000 0.57142857 0.67441860 0.62264151 0.65853659  
## Yes 0.31707317 0.55000000 0.42857143 0.32558140 0.37735849 0.34146341  
##   
## 12.1 12.2 12.3 12.4 12.5 12.6  
## No 0.63793103 0.66666667 0.56410256 0.61643836 0.46774194 0.68493151  
## Yes 0.36206897 0.33333333 0.43589744 0.38356164 0.53225806 0.31506849  
##   
## 12.7 12.8 12.9 13 13.1 13.2  
## No 0.67741935 0.60759494 0.62500000 0.73076923 0.67142857 0.57971014  
## Yes 0.32258065 0.39240506 0.37500000 0.26923077 0.32857143 0.42028986  
##   
## 13.3 13.4 13.5 13.6 13.7 13.8  
## No 0.57894737 0.65671642 0.75714286 0.72340426 0.68888889 0.58333333  
## Yes 0.42105263 0.34328358 0.24285714 0.27659574 0.31111111 0.41666667  
##   
## 13.9 14 14.1 14.2 14.3 14.4  
## No 0.71604938 0.70786517 0.70103093 0.56842105 0.64000000 0.63000000  
## Yes 0.28395062 0.29213483 0.29896907 0.43157895 0.36000000 0.37000000  
##   
## 14.5 14.6 14.7 14.8 14.9 15  
## No 0.63541667 0.68141593 0.65217391 0.73873874 0.67032967 0.68695652  
## Yes 0.36458333 0.31858407 0.34782609 0.26126126 0.32967033 0.31304348  
##   
## 15.1 15.2 15.3 15.4 15.5 15.6  
## No 0.67961165 0.73437500 0.69000000 0.69072165 0.75454545 0.70093458  
## Yes 0.32038835 0.26562500 0.31000000 0.30927835 0.24545455 0.29906542  
##   
## 15.7 15.8 15.9 16 16.1 16.2  
## No 0.65486726 0.74336283 0.71311475 0.75590551 0.72727273 0.68800000  
## Yes 0.34513274 0.25663717 0.28688525 0.24409449 0.27272727 0.31200000  
##   
## 16.3 16.4 16.5 16.6 16.7 16.8  
## No 0.66071429 0.72033898 0.73170732 0.76800000 0.68907563 0.73451327  
## Yes 0.33928571 0.27966102 0.26829268 0.23200000 0.31092437 0.26548673  
##   
## 16.9 17 17.1 17.2 17.3 17.4  
## No 0.77952756 0.69879518 0.75213675 0.70000000 0.70731707 0.66187050  
## Yes 0.22047244 0.30120482 0.24786325 0.30000000 0.29268293 0.33812950  
##   
## 17.5 17.6 17.7 17.8 17.9 18  
## No 0.69064748 0.73509934 0.75757576 0.68055556 0.72262774 0.72500000  
## Yes 0.30935252 0.26490066 0.24242424 0.31944444 0.27737226 0.27500000  
##   
## 18.1 18.2 18.3 18.4 18.5 18.6  
## No 0.73880597 0.75657895 0.62913907 0.74305556 0.76543210 0.70422535  
## Yes 0.26119403 0.24342105 0.37086093 0.25694444 0.23456790 0.29577465  
##   
## 18.7 18.8 18.9 19 19.1 19.2  
## No 0.74468085 0.75675676 0.68181818 0.77848101 0.68702290 0.72180451  
## Yes 0.25531915 0.24324324 0.31818182 0.22151899 0.31297710 0.27819549  
##   
## 19.3 19.4 19.5 19.6 19.7 19.8  
## No 0.75159236 0.75172414 0.73026316 0.73248408 0.69918699 0.81632653  
## Yes 0.24840764 0.24827586 0.26973684 0.26751592 0.30081301 0.18367347  
##   
## 19.9 20 20.1 20.2 20.3 20.4  
## No 0.81707317 0.77127660 0.74846626 0.71176471 0.80821918 0.71232877  
## Yes 0.18292683 0.22872340 0.25153374 0.28823529 0.19178082 0.28767123  
##   
## 20.5 20.6 20.7 20.8 20.9 21  
## No 0.77852349 0.81456954 0.77852349 0.75609756 0.75862069 0.79393939  
## Yes 0.22147651 0.18543046 0.22147651 0.24390244 0.24137931 0.20606061  
##   
## 21.1 21.2 21.3 21.4 21.5 21.6  
## No 0.79245283 0.79220779 0.73381295 0.75625000 0.79629630 0.81617647  
## Yes 0.20754717 0.20779221 0.26618705 0.24375000 0.20370370 0.18382353  
##   
## 21.7 21.8 21.9 22 22.1 22.2  
## No 0.83132530 0.83766234 0.77165354 0.72666667 0.75735294 0.78947368  
## Yes 0.16867470 0.16233766 0.22834646 0.27333333 0.24264706 0.21052632  
##   
## 22.3 22.4 22.5 22.6 22.7 22.8  
## No 0.79411765 0.83333333 0.77464789 0.80921053 0.78048780 0.83206107  
## Yes 0.20588235 0.16666667 0.22535211 0.19078947 0.21951220 0.16793893  
##   
## 22.9 23 23.1 23.2 23.3 23.4  
## No 0.82692308 0.76027397 0.78906250 0.75630252 0.78225806 0.76870748  
## Yes 0.17307692 0.23972603 0.21093750 0.24369748 0.21774194 0.23129252  
##   
## 23.5 23.6 23.7 23.8 23.9 24  
## No 0.82575758 0.82575758 0.79090909 0.75396825 0.81707317 0.84397163  
## Yes 0.17424242 0.17424242 0.20909091 0.24603175 0.18292683 0.15602837  
##   
## 24.1 24.2 24.3 24.4 24.5 24.6  
## No 0.88617886 0.87903226 0.85600000 0.80327869 0.87301587 0.81060606  
## Yes 0.11382114 0.12096774 0.14400000 0.19672131 0.12698413 0.18939394  
##   
## 24.7 24.8 24.9 25 25.1 25.2  
## No 0.82170543 0.81690141 0.89344262 0.78980892 0.83593750 0.79310345  
## Yes 0.17829457 0.18309859 0.10655738 0.21019108 0.16406250 0.20689655  
##   
## 25.3 25.4 25.5 25.6 25.7 25.8  
## No 0.80357143 0.82677165 0.84496124 0.84328358 0.76785714 0.81818182  
## Yes 0.19642857 0.17322835 0.15503876 0.15671642 0.23214286 0.18181818  
##   
## 25.9 26 26.1 26.2 26.3 26.4  
## No 0.88333333 0.80985915 0.76388889 0.85840708 0.85148515 0.82882883  
## Yes 0.11666667 0.19014085 0.23611111 0.14159292 0.14851485 0.17117117  
##   
## 26.5 26.6 26.7 26.8 26.9 27  
## No 0.81889764 0.83962264 0.84892086 0.84259259 0.79816514 0.75555556  
## Yes 0.18110236 0.16037736 0.15107914 0.15740741 0.20183486 0.24444444  
##   
## 27.1 27.2 27.3 27.4 27.5 27.6  
## No 0.84615385 0.86567164 0.79090909 0.78861789 0.81188119 0.80769231  
## Yes 0.15384615 0.13432836 0.20909091 0.21138211 0.18811881 0.19230769  
##   
## 27.7 27.8 27.9 28 28.1 28.2  
## No 0.78846154 0.83516484 0.87301587 0.72477064 0.82352941 0.83760684  
## Yes 0.21153846 0.16483516 0.12698413 0.27522936 0.17647059 0.16239316  
##   
## 28.3 28.4 28.5 28.6 28.7 28.8  
## No 0.87628866 0.82692308 0.88596491 0.84848485 0.85454545 0.88695652  
## Yes 0.12371134 0.17307692 0.11403509 0.15151515 0.14545455 0.11304348  
##   
## 28.9 29 29.1 29.2 29.3 29.4  
## No 0.86315789 0.83962264 0.82203390 0.85263158 0.83505155 0.85567010  
## Yes 0.13684211 0.16037736 0.17796610 0.14736842 0.16494845 0.14432990  
##   
## 29.5 29.6 29.7 29.8 29.9 30  
## No 0.81308411 0.87951807 0.84337349 0.86315789 0.77419355 0.85217391  
## Yes 0.18691589 0.12048193 0.15662651 0.13684211 0.22580645 0.14782609  
##   
## 30.1 30.2 30.3 30.4 30.5 30.6  
## No 0.83561644 0.83695652 0.87368421 0.82417582 0.81904762 0.86046512  
## Yes 0.16438356 0.16304348 0.12631579 0.17582418 0.18095238 0.13953488  
##   
## 30.7 30.8 30.9 31 31.1 31.2  
## No 0.75641026 0.80612245 0.80000000 0.72222222 0.86046512 0.81521739  
## Yes 0.24358974 0.19387755 0.20000000 0.27777778 0.13953488 0.18478261  
##   
## 31.3 31.4 31.5 31.6 31.7 31.8  
## No 0.79220779 0.82857143 0.81318681 0.75903614 0.81428571 0.83950617  
## Yes 0.20779221 0.17142857 0.18681319 0.24096386 0.18571429 0.16049383  
##   
## 31.9 32 32.1 32.2 32.3 32.4  
## No 0.75581395 0.82417582 0.80000000 0.90588235 0.67123288 0.78947368  
## Yes 0.24418605 0.17582418 0.20000000 0.09411765 0.32876712 0.21052632  
##   
## 32.5 32.6 32.7 32.8 32.9 33  
## No 0.84615385 0.84615385 0.84285714 0.83561644 0.90140845 0.88235294  
## Yes 0.15384615 0.15384615 0.15714286 0.16438356 0.09859155 0.11764706  
##   
## 33.1 33.2 33.3 33.4 33.5 33.6  
## No 0.76923077 0.84210526 0.82608696 0.70967742 0.82812500 0.82857143  
## Yes 0.23076923 0.15789474 0.17391304 0.29032258 0.17187500 0.17142857  
##   
## 33.7 33.8 33.9 34 34.1 34.2  
## No 0.84126984 0.79245283 0.89230769 0.80000000 0.79310345 0.82456140  
## Yes 0.15873016 0.20754717 0.10769231 0.20000000 0.20689655 0.17543860  
##   
## 34.3 34.4 34.5 34.6 34.7 34.8  
## No 0.75000000 0.90909091 0.82352941 0.84782609 0.87179487 0.91666667  
## Yes 0.25000000 0.09090909 0.17647059 0.15217391 0.12820513 0.08333333  
##   
## 34.9 35 35.1 35.2 35.3 35.4  
## No 0.82352941 0.90476190 0.88095238 0.90243902 0.82352941 0.93181818  
## Yes 0.17647059 0.09523810 0.11904762 0.09756098 0.17647059 0.06818182  
##   
## 35.5 35.6 35.7 35.8 35.9 36  
## No 0.90243902 0.88888889 0.90000000 0.92592593 0.88000000 0.82758621  
## Yes 0.09756098 0.11111111 0.10000000 0.07407407 0.12000000 0.17241379  
##   
## 36.1 36.2 36.3 36.4 36.5 36.6  
## No 0.88888889 0.96428571 0.91176471 0.86956522 0.82352941 0.95454545  
## Yes 0.11111111 0.03571429 0.08823529 0.13043478 0.17647059 0.04545455  
##   
## 36.7 36.8 36.9 37 37.1 37.2  
## No 0.91304348 0.91304348 0.85714286 0.89189189 0.97058824 0.91176471  
## Yes 0.08695652 0.08695652 0.14285714 0.10810811 0.02941176 0.08823529  
##   
## 37.3 37.4 37.5 37.6 37.7 37.8  
## No 0.95833333 0.82758621 0.83333333 0.75000000 0.88461538 1.00000000  
## Yes 0.04166667 0.17241379 0.16666667 0.25000000 0.11538462 0.00000000  
##   
## 37.9 38 38.1 38.2 38.3 38.4  
## No 1.00000000 0.86363636 0.94444444 0.90909091 1.00000000 0.78947368  
## Yes 0.00000000 0.13636364 0.05555556 0.09090909 0.00000000 0.21052632  
##   
## 38.5 38.6 38.7 38.8 38.9 39  
## No 0.85714286 0.94736842 0.91666667 0.95652174 0.83333333 0.90476190  
## Yes 0.14285714 0.05263158 0.08333333 0.04347826 0.16666667 0.09523810  
##   
## 39.1 39.2 39.3 39.4 39.5 39.6  
## No 0.91304348 1.00000000 0.95000000 1.00000000 0.83333333 0.92307692  
## Yes 0.08695652 0.00000000 0.05000000 0.00000000 0.16666667 0.07692308  
##   
## 39.7 39.8 39.9 40 40.1 40.2  
## No 0.84615385 0.92307692 0.92307692 0.75000000 0.75000000 0.85714286  
## Yes 0.15384615 0.07692308 0.07692308 0.25000000 0.25000000 0.14285714  
##   
## 40.3 40.4 40.5 40.6 40.7 40.8  
## No 0.82352941 0.83333333 0.93333333 0.88888889 0.90000000 1.00000000  
## Yes 0.17647059 0.16666667 0.06666667 0.11111111 0.10000000 0.00000000  
##   
## 40.9 41 41.1 41.2 41.3 41.4  
## No 0.78571429 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.21428571 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 41.5 41.6 41.7 41.8 41.9 42  
## No 0.87500000 1.00000000 1.00000000 1.00000000 0.83333333 1.00000000  
## Yes 0.12500000 0.00000000 0.00000000 0.00000000 0.16666667 0.00000000  
##   
## 42.1 42.2 42.3 42.4 42.5 42.6  
## No 0.87500000 1.00000000 1.00000000 0.83333333 0.42857143 1.00000000  
## Yes 0.12500000 0.00000000 0.00000000 0.16666667 0.57142857 0.00000000  
##   
## 42.7 42.8 42.9 43 43.1 43.2  
## No 1.00000000 1.00000000 1.00000000 0.75000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.25000000 0.00000000 0.00000000  
##   
## 43.3 43.4 43.5 43.6 43.7 43.8  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 43.9 44 44.1 44.2 44.3 44.4  
## No 1.00000000 1.00000000 0.75000000 1.00000000 1.00000000 0.00000000  
## Yes 0.00000000 0.00000000 0.25000000 0.00000000 0.00000000 1.00000000  
##   
## 44.5 44.8 45.1 45.2 45.3 45.5  
## No 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 46 46.3 46.6 47  
## No 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 0.00000000

#Looking at the relationship of RainTomorrow to MinTemp \*\*  
ggplot(rain\_complete, aes(x= MinTemp, fill= RainTomorrow)) + geom\_bar()



#table view  
tb10 = table(rain\_complete$RainTomorrow, rain\_complete$MinTemp) #creates table object  
prop.table(tb10, margin = 2) #crosstab with proportions

##   
## -8.5 -8 -7.3 -7 -6.7 -6.6  
## No 1.00000000 1.00000000 1.00000000 0.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.00000000 1.00000000 0.00000000 0.00000000  
##   
## -6.5 -6.1 -6 -5.9 -5.8 -5.6  
## No 1.00000000 1.00000000 0.66666667 1.00000000 1.00000000 1.00000000  
## Yes 0.00000000 0.00000000 0.33333333 0.00000000 0.00000000 0.00000000  
##   
## -5.5 -5.4 -5.3 -5.2 -5.1 -5  
## No 0.66666667 1.00000000 1.00000000 0.66666667 1.00000000 1.00000000  
## Yes 0.33333333 0.00000000 0.00000000 0.33333333 0.00000000 0.00000000  
##   
## -4.8 -4.7 -4.6 -4.5 -4.4 -4.3  
## No 0.66666667 0.50000000 1.00000000 0.87500000 0.75000000 0.85714286  
## Yes 0.33333333 0.50000000 0.00000000 0.12500000 0.25000000 0.14285714  
##   
## -4.2 -4.1 -4 -3.9 -3.8 -3.7  
## No 1.00000000 0.80000000 0.80000000 1.00000000 0.77777778 0.71428571  
## Yes 0.00000000 0.20000000 0.20000000 0.00000000 0.22222222 0.28571429  
##   
## -3.6 -3.5 -3.4 -3.3 -3.2 -3.1  
## No 0.87500000 0.88888889 0.80000000 0.87500000 1.00000000 1.00000000  
## Yes 0.12500000 0.11111111 0.20000000 0.12500000 0.00000000 0.00000000  
##   
## -3 -2.9 -2.8 -2.7 -2.6 -2.5  
## No 1.00000000 0.50000000 1.00000000 1.00000000 0.83333333 0.71428571  
## Yes 0.00000000 0.50000000 0.00000000 0.00000000 0.16666667 0.28571429  
##   
## -2.4 -2.3 -2.2 -2.1 -2 -1.9  
## No 0.81818182 1.00000000 0.69230769 0.88235294 1.00000000 0.75000000  
## Yes 0.18181818 0.00000000 0.30769231 0.11764706 0.00000000 0.25000000  
##   
## -1.8 -1.7 -1.6 -1.5 -1.4 -1.3  
## No 0.80000000 0.76923077 0.78947368 0.97142857 1.00000000 0.92857143  
## Yes 0.20000000 0.23076923 0.21052632 0.02857143 0.00000000 0.07142857  
##   
## -1.2 -1.1 -1 -0.9 -0.8 -0.7  
## No 1.00000000 0.85714286 0.93548387 0.84615385 0.95833333 1.00000000  
## Yes 0.00000000 0.14285714 0.06451613 0.15384615 0.04166667 0.00000000  
##   
## -0.6 -0.5 -0.4 -0.3 -0.2 -0.1  
## No 0.90909091 0.80555556 0.87500000 0.87500000 0.84848485 0.87500000  
## Yes 0.09090909 0.19444444 0.12500000 0.12500000 0.15151515 0.12500000  
##   
## 0 0.1 0.2 0.3 0.4 0.5  
## No 0.87096774 0.94444444 0.87096774 0.89285714 0.90476190 0.86363636  
## Yes 0.12903226 0.05555556 0.12903226 0.10714286 0.09523810 0.13636364  
##   
## 0.6 0.7 0.8 0.9 1 1.1  
## No 0.90000000 0.91891892 0.88372093 0.91489362 0.86486486 0.85416667  
## Yes 0.10000000 0.08108108 0.11627907 0.08510638 0.13513514 0.14583333  
##   
## 1.2 1.3 1.4 1.5 1.6 1.7  
## No 0.93617021 0.88636364 0.95121951 0.73529412 0.78260870 0.91071429  
## Yes 0.06382979 0.11363636 0.04878049 0.26470588 0.21739130 0.08928571  
##   
## 1.8 1.9 2 2.1 2.2 2.3  
## No 0.92592593 0.88000000 0.89130435 0.88333333 0.88888889 0.89285714  
## Yes 0.07407407 0.12000000 0.10869565 0.11666667 0.11111111 0.10714286  
##   
## 2.4 2.5 2.6 2.7 2.8 2.9  
## No 0.88000000 0.79729730 0.89062500 0.87058824 0.77272727 0.87878788  
## Yes 0.12000000 0.20270270 0.10937500 0.12941176 0.22727273 0.12121212  
##   
## 3 3.1 3.2 3.3 3.4 3.5  
## No 0.89830508 0.86764706 0.82432432 0.87500000 0.91208791 0.84722222  
## Yes 0.10169492 0.13235294 0.17567568 0.12500000 0.08791209 0.15277778  
##   
## 3.6 3.7 3.8 3.9 4 4.1  
## No 0.84507042 0.84210526 0.84057971 0.90666667 0.79687500 0.83333333  
## Yes 0.15492958 0.15789474 0.15942029 0.09333333 0.20312500 0.16666667  
##   
## 4.2 4.3 4.4 4.5 4.6 4.7  
## No 0.73684211 0.86250000 0.81188119 0.76666667 0.80000000 0.85555556  
## Yes 0.26315789 0.13750000 0.18811881 0.23333333 0.20000000 0.14444444  
##   
## 4.8 4.9 5 5.1 5.2 5.3  
## No 0.78260870 0.80808081 0.79310345 0.80952381 0.81914894 0.86021505  
## Yes 0.21739130 0.19191919 0.20689655 0.19047619 0.18085106 0.13978495  
##   
## 5.4 5.5 5.6 5.7 5.8 5.9  
## No 0.81196581 0.83471074 0.85585586 0.81451613 0.74218750 0.80645161  
## Yes 0.18803419 0.16528926 0.14414414 0.18548387 0.25781250 0.19354839  
##   
## 6 6.1 6.2 6.3 6.4 6.5  
## No 0.83673469 0.84955752 0.78358209 0.78260870 0.76521739 0.80357143  
## Yes 0.16326531 0.15044248 0.21641791 0.21739130 0.23478261 0.19642857  
##   
## 6.6 6.7 6.8 6.9 7 7.1  
## No 0.83125000 0.79699248 0.80597015 0.80740741 0.80000000 0.76470588  
## Yes 0.16875000 0.20300752 0.19402985 0.19259259 0.20000000 0.23529412  
##   
## 7.2 7.3 7.4 7.5 7.6 7.7  
## No 0.76190476 0.79470199 0.75206612 0.75816993 0.76100629 0.74657534  
## Yes 0.23809524 0.20529801 0.24793388 0.24183007 0.23899371 0.25342466  
##   
## 7.8 7.9 8 8.1 8.2 8.3  
## No 0.76129032 0.78767123 0.74125874 0.76973684 0.77777778 0.75609756  
## Yes 0.23870968 0.21232877 0.25874126 0.23026316 0.22222222 0.24390244  
##   
## 8.4 8.5 8.6 8.7 8.8 8.9  
## No 0.78846154 0.76300578 0.80536913 0.73825503 0.80000000 0.80459770  
## Yes 0.21153846 0.23699422 0.19463087 0.26174497 0.20000000 0.19540230  
##   
## 9 9.1 9.2 9.3 9.4 9.5  
## No 0.80000000 0.77094972 0.82666667 0.74691358 0.72592593 0.75449102  
## Yes 0.20000000 0.22905028 0.17333333 0.25308642 0.27407407 0.24550898  
##   
## 9.6 9.7 9.8 9.9 10 10.1  
## No 0.78571429 0.79452055 0.79874214 0.80000000 0.80701754 0.78125000  
## Yes 0.21428571 0.20547945 0.20125786 0.20000000 0.19298246 0.21875000  
##   
## 10.2 10.3 10.4 10.5 10.6 10.7  
## No 0.74172185 0.74218750 0.69230769 0.77777778 0.79054054 0.70391061  
## Yes 0.25827815 0.25781250 0.30769231 0.22222222 0.20945946 0.29608939  
##   
## 10.8 10.9 11 11.1 11.2 11.3  
## No 0.72781065 0.78835979 0.74444444 0.76623377 0.73125000 0.74342105  
## Yes 0.27218935 0.21164021 0.25555556 0.23376623 0.26875000 0.25657895  
##   
## 11.4 11.5 11.6 11.7 11.8 11.9  
## No 0.73248408 0.73584906 0.75000000 0.76331361 0.73714286 0.72955975  
## Yes 0.26751592 0.26415094 0.25000000 0.23668639 0.26285714 0.27044025  
##   
## 12 12.1 12.2 12.3 12.4 12.5  
## No 0.76000000 0.76582278 0.77931034 0.80714286 0.77631579 0.83333333  
## Yes 0.24000000 0.23417722 0.22068966 0.19285714 0.22368421 0.16666667  
##   
## 12.6 12.7 12.8 12.9 13 13.1  
## No 0.73202614 0.74050633 0.76774194 0.78145695 0.75625000 0.79487179  
## Yes 0.26797386 0.25949367 0.23225806 0.21854305 0.24375000 0.20512821  
##   
## 13.2 13.3 13.4 13.5 13.6 13.7  
## No 0.82911392 0.75000000 0.78823529 0.77173913 0.73170732 0.77333333  
## Yes 0.17088608 0.25000000 0.21176471 0.22826087 0.26829268 0.22666667  
##   
## 13.8 13.9 14 14.1 14.2 14.3  
## No 0.77622378 0.74522293 0.79310345 0.80158730 0.76190476 0.75000000  
## Yes 0.22377622 0.25477707 0.20689655 0.19841270 0.23809524 0.25000000  
##   
## 14.4 14.5 14.6 14.7 14.8 14.9  
## No 0.82608696 0.73417722 0.82666667 0.76056338 0.74264706 0.77083333  
## Yes 0.17391304 0.26582278 0.17333333 0.23943662 0.25735294 0.22916667  
##   
## 15 15.1 15.2 15.3 15.4 15.5  
## No 0.81168831 0.77049180 0.79699248 0.85365854 0.79166667 0.78205128  
## Yes 0.18831169 0.22950820 0.20300752 0.14634146 0.20833333 0.21794872  
##   
## 15.6 15.7 15.8 15.9 16 16.1  
## No 0.79710145 0.80821918 0.76923077 0.79545455 0.82677165 0.79674797  
## Yes 0.20289855 0.19178082 0.23076923 0.20454545 0.17322835 0.20325203  
##   
## 16.2 16.3 16.4 16.5 16.6 16.7  
## No 0.79020979 0.76923077 0.74626866 0.78400000 0.79687500 0.78225806  
## Yes 0.20979021 0.23076923 0.25373134 0.21600000 0.20312500 0.21774194  
##   
## 16.8 16.9 17 17.1 17.2 17.3  
## No 0.81512605 0.76842105 0.82644628 0.71428571 0.81147541 0.77192982  
## Yes 0.18487395 0.23157895 0.17355372 0.28571429 0.18852459 0.22807018  
##   
## 17.4 17.5 17.6 17.7 17.8 17.9  
## No 0.79464286 0.76422764 0.70434783 0.75229358 0.81355932 0.78787879  
## Yes 0.20535714 0.23577236 0.29565217 0.24770642 0.18644068 0.21212121  
##   
## 18 18.1 18.2 18.3 18.4 18.5  
## No 0.76271186 0.81188119 0.78333333 0.67592593 0.73504274 0.68085106  
## Yes 0.23728814 0.18811881 0.21666667 0.32407407 0.26495726 0.31914894  
##   
## 18.6 18.7 18.8 18.9 19 19.1  
## No 0.66037736 0.78301887 0.72448980 0.75862069 0.70138889 0.80219780  
## Yes 0.33962264 0.21698113 0.27551020 0.24137931 0.29861111 0.19780220  
##   
## 19.2 19.3 19.4 19.5 19.6 19.7  
## No 0.79268293 0.77380952 0.67647059 0.70754717 0.80000000 0.71681416  
## Yes 0.20731707 0.22619048 0.32352941 0.29245283 0.20000000 0.28318584  
##   
## 19.8 19.9 20 20.1 20.2 20.3  
## No 0.76785714 0.77000000 0.72794118 0.66279070 0.76595745 0.70212766  
## Yes 0.23214286 0.23000000 0.27205882 0.33720930 0.23404255 0.29787234  
##   
## 20.4 20.5 20.6 20.7 20.8 20.9  
## No 0.73563218 0.78723404 0.75555556 0.71641791 0.73684211 0.77500000  
## Yes 0.26436782 0.21276596 0.24444444 0.28358209 0.26315789 0.22500000  
##   
## 21 21.1 21.2 21.3 21.4 21.5  
## No 0.81159420 0.68604651 0.81578947 0.73846154 0.71428571 0.72368421  
## Yes 0.18840580 0.31395349 0.18421053 0.26153846 0.28571429 0.27631579  
##   
## 21.6 21.7 21.8 21.9 22 22.1  
## No 0.79710145 0.81967213 0.76388889 0.77358491 0.66666667 0.71153846  
## Yes 0.20289855 0.18032787 0.23611111 0.22641509 0.33333333 0.28846154  
##   
## 22.2 22.3 22.4 22.5 22.6 22.7  
## No 0.75000000 0.66000000 0.79365079 0.77777778 0.74545455 0.73913043  
## Yes 0.25000000 0.34000000 0.20634921 0.22222222 0.25454545 0.26086957  
##   
## 22.8 22.9 23 23.1 23.2 23.3  
## No 0.68627451 0.67346939 0.69387755 0.71153846 0.80434783 0.66666667  
## Yes 0.31372549 0.32653061 0.30612245 0.28846154 0.19565217 0.33333333  
##   
## 23.4 23.5 23.6 23.7 23.8 23.9  
## No 0.63043478 0.59259259 0.67441860 0.69230769 0.55000000 0.62745098  
## Yes 0.36956522 0.40740741 0.32558140 0.30769231 0.45000000 0.37254902  
##   
## 24 24.1 24.2 24.3 24.4 24.5  
## No 0.63636364 0.64000000 0.58536585 0.66666667 0.67500000 0.60000000  
## Yes 0.36363636 0.36000000 0.41463415 0.33333333 0.32500000 0.40000000  
##   
## 24.6 24.7 24.8 24.9 25 25.1  
## No 0.43750000 0.52500000 0.55102041 0.60714286 0.75675676 0.58064516  
## Yes 0.56250000 0.47500000 0.44897959 0.39285714 0.24324324 0.41935484  
##   
## 25.2 25.3 25.4 25.5 25.6 25.7  
## No 0.69696970 0.56666667 0.69230769 0.60606061 0.70588235 0.76923077  
## Yes 0.30303030 0.43333333 0.30769231 0.39393939 0.29411765 0.23076923  
##   
## 25.8 25.9 26 26.1 26.2 26.3  
## No 0.46666667 0.57142857 0.60000000 0.68421053 0.66666667 0.64285714  
## Yes 0.53333333 0.42857143 0.40000000 0.31578947 0.33333333 0.35714286  
##   
## 26.4 26.5 26.6 26.7 26.8 26.9  
## No 0.78571429 0.66666667 0.62500000 0.66666667 0.27272727 0.83333333  
## Yes 0.21428571 0.33333333 0.37500000 0.33333333 0.72727273 0.16666667  
##   
## 27 27.1 27.2 27.3 27.4 27.5  
## No 0.57142857 0.75000000 0.57142857 0.60000000 0.60000000 0.75000000  
## Yes 0.42857143 0.25000000 0.42857143 0.40000000 0.40000000 0.25000000  
##   
## 27.6 27.7 27.8 27.9 28 28.1  
## No 1.00000000 0.85714286 1.00000000 0.66666667 0.33333333 1.00000000  
## Yes 0.00000000 0.14285714 0.00000000 0.33333333 0.66666667 0.00000000  
##   
## 28.2 28.3 28.4 28.5 28.6 28.7  
## No 0.75000000 0.50000000 0.50000000 1.00000000 0.50000000 1.00000000  
## Yes 0.25000000 0.50000000 0.50000000 0.00000000 0.50000000 0.00000000  
##   
## 28.8 28.9 29 29.4 29.6 29.7  
## No 0.66666667 1.00000000 1.00000000 1.00000000 1.00000000 1.00000000  
## Yes 0.33333333 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000  
##   
## 30.5  
## No 1.00000000  
## Yes 0.00000000

From this initial test, I believe RainToday, AvgHumidity, AvgPressure, MinTemp, MaxTemp, WindGustSpeed, WindGustDir, and Rainfall are predictors of the response variable. But to be sure I need to do further tests.

# Finding Most Significant Variables using Backward Stepwise

allmod =glm(RainTomorrow~., rain\_complete, family = "binomial")  
summary(allmod)

##   
## Call:  
## glm(formula = RainTomorrow ~ ., family = "binomial", data = rain\_complete)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -3.2223 -0.5923 -0.3398 -0.1259 3.3308   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 51.606803 3.207907 16.087 < 2e-16 \*\*\*  
## RainTodayYes 0.300501 0.045107 6.662 2.70e-11 \*\*\*  
## Rainfall 0.007619 0.002359 3.229 0.001241 \*\*   
## MaxTemp -0.098279 0.013169 -7.463 8.46e-14 \*\*\*  
## MinTemp 0.057442 0.008262 6.952 3.59e-12 \*\*\*  
## WindGustDirWNW 0.111728 0.091113 1.226 0.220101   
## WindGustDirENE -0.052780 0.104498 -0.505 0.613499   
## WindGustDirNE -0.020618 0.102250 -0.202 0.840195   
## WindGustDirNW 0.206067 0.091263 2.258 0.023949 \*   
## WindGustDirNNE 0.216843 0.102618 2.113 0.034592 \*   
## WindGustDirNNW 0.369241 0.096503 3.826 0.000130 \*\*\*  
## WindGustDirE -0.003502 0.099173 -0.035 0.971831   
## WindGustDirN 0.408587 0.090164 4.532 5.85e-06 \*\*\*  
## WindGustDirWSW -0.068796 0.090469 -0.760 0.446998   
## WindGustDirSE -0.039513 0.094537 -0.418 0.675977   
## WindGustDirESE -0.007958 0.103970 -0.077 0.938991   
## WindGustDirSW -0.013784 0.091719 -0.150 0.880538   
## WindGustDirS -0.101348 0.092077 -1.101 0.271032   
## WindGustDirSSE -0.057483 0.094638 -0.607 0.543585   
## WindGustDirSSW -0.157204 0.092726 -1.695 0.090008 .   
## WindGustSpeed 0.057256 0.002026 28.257 < 2e-16 \*\*\*  
## AvgHumidity 0.067960 0.001729 39.298 < 2e-16 \*\*\*  
## AvgPressure -0.057868 0.003115 -18.579 < 2e-16 \*\*\*  
## AvgWindSpeed -0.048086 0.003379 -14.229 < 2e-16 \*\*\*  
## AvgTemp 0.066782 0.018561 3.598 0.000321 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 29834 on 28002 degrees of freedom  
## Residual deviance: 21152 on 27978 degrees of freedom  
## AIC: 21202  
##   
## Number of Fisher Scoring iterations: 5

#backward  
backmod =stepAIC(allmod, direction = "backward", trace = FALSE)  
summary(backmod)

##   
## Call:  
## glm(formula = RainTomorrow ~ RainToday + Rainfall + MaxTemp +   
## MinTemp + WindGustDir + WindGustSpeed + AvgHumidity + AvgPressure +   
## AvgWindSpeed + AvgTemp, family = "binomial", data = rain\_complete)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -3.2223 -0.5923 -0.3398 -0.1259 3.3308   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 51.606803 3.207907 16.087 < 2e-16 \*\*\*  
## RainTodayYes 0.300501 0.045107 6.662 2.70e-11 \*\*\*  
## Rainfall 0.007619 0.002359 3.229 0.001241 \*\*   
## MaxTemp -0.098279 0.013169 -7.463 8.46e-14 \*\*\*  
## MinTemp 0.057442 0.008262 6.952 3.59e-12 \*\*\*  
## WindGustDirWNW 0.111728 0.091113 1.226 0.220101   
## WindGustDirENE -0.052780 0.104498 -0.505 0.613499   
## WindGustDirNE -0.020618 0.102250 -0.202 0.840195   
## WindGustDirNW 0.206067 0.091263 2.258 0.023949 \*   
## WindGustDirNNE 0.216843 0.102618 2.113 0.034592 \*   
## WindGustDirNNW 0.369241 0.096503 3.826 0.000130 \*\*\*  
## WindGustDirE -0.003502 0.099173 -0.035 0.971831   
## WindGustDirN 0.408587 0.090164 4.532 5.85e-06 \*\*\*  
## WindGustDirWSW -0.068796 0.090469 -0.760 0.446998   
## WindGustDirSE -0.039513 0.094537 -0.418 0.675977   
## WindGustDirESE -0.007958 0.103970 -0.077 0.938991   
## WindGustDirSW -0.013784 0.091719 -0.150 0.880538   
## WindGustDirS -0.101348 0.092077 -1.101 0.271032   
## WindGustDirSSE -0.057483 0.094638 -0.607 0.543585   
## WindGustDirSSW -0.157204 0.092726 -1.695 0.090008 .   
## WindGustSpeed 0.057256 0.002026 28.257 < 2e-16 \*\*\*  
## AvgHumidity 0.067960 0.001729 39.298 < 2e-16 \*\*\*  
## AvgPressure -0.057868 0.003115 -18.579 < 2e-16 \*\*\*  
## AvgWindSpeed -0.048086 0.003379 -14.229 < 2e-16 \*\*\*  
## AvgTemp 0.066782 0.018561 3.598 0.000321 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 29834 on 28002 degrees of freedom  
## Residual deviance: 21152 on 27978 degrees of freedom  
## AIC: 21202  
##   
## Number of Fisher Scoring iterations: 5

From this model, I have determined that RainToday, Rainfall, MaxTemp, MinTemp, WindGustSpeed, AvgHumidity, AvgPressure, AvgWindSpeed, and AvgTemp are significant indicators of if it will RainTomorrow. WindGustDirection is conditionally significant, in that only three directions [NNW, N, SSW] showed to have a significant impact on rain, with the N Wind having the most significant impact.

Lastly, before moving onto part two, I will split the data into my training and testing sets with a set seed of 1234.

### Creating Training and Testing Sets

set.seed(1234) #sets random number seed for cross validation  
train.rows = createDataPartition(y = rain$RainTomorrow, p=0.7, list= FALSE)  
train = rain[train.rows,]  
test = rain[-train.rows,]