Graphing Data Using GGPlot

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ggplot attempts to create a consistent framework for build graphs "layer by layer" in R.

YOU CONSTRUCT A GRAPH BY SPECIFYING:

1. The data.
2. An aesthetic (e.g., colors, line styles, the coordinate system, etc).
3. A graph "geometry" (e.g., boxplot, scatterplot, etc). This is where you specify the kind of graph you want.
4. Labels. The plot title, axis labels, etc.

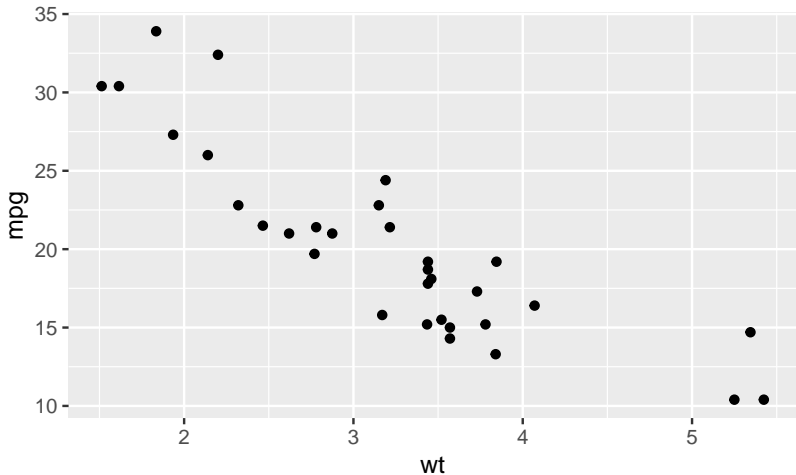Creating the graph object and specifying the dataset.

```
library(ggplot2)
car.graph <- ggplot(mtcars)
```

- Specifying what aesthetics to use.
- In this case, the coordinate system to use – meaning the x-y axis.
- This is sometimes also referred to as the "mapping" being used.

```
car.graph <- car.graph + aes(wt, mpg)
```
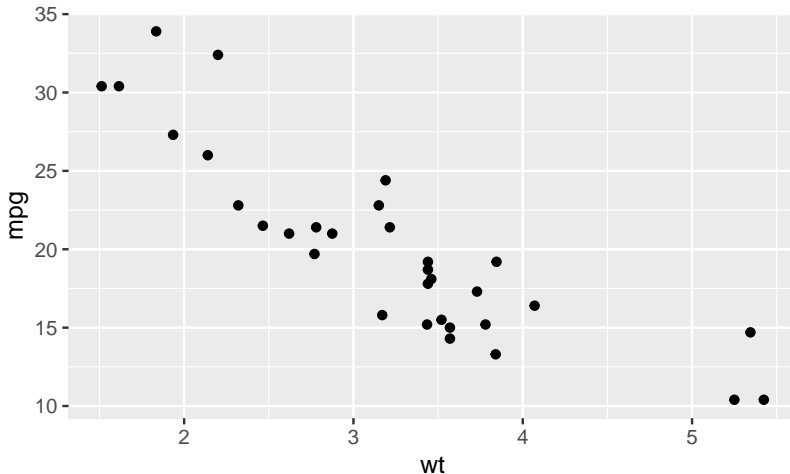
```
## Specifying the plot "geometry" in this case, a scatter plot.
car.graph + geom_point()
```

We can also create the plot without storing all of the intermediate states

```
ggplot(mtcars) + aes(wt, mpg) + geom_point()
```

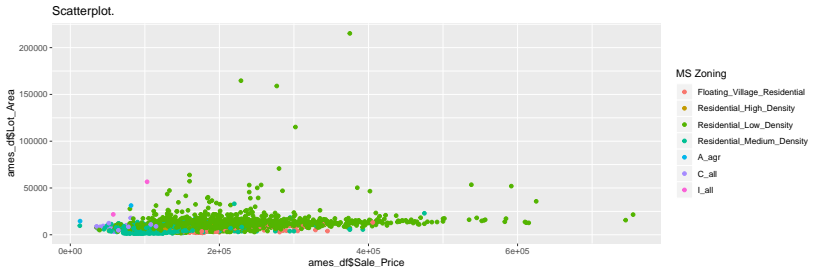# The Ames Housing dataset

```
ames_df <- AmesHousing::make_ames()
```
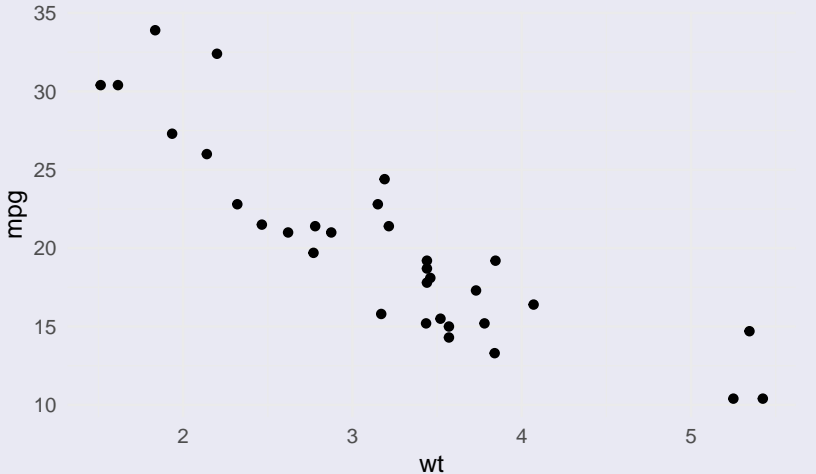
```
ggplot(ames_df) +
    aes(x=ames_df$Sale_Price, y=ames_df$Lot_Area) +
    geom_point(aes(col=as.factor(ames_df$MS_Zoning))) +
    labs(title="Scatterplot.", color="MS Zoning") +
    theme(legend.title=element_text(color="black"))
```

THEMES

```
## Minimal theme
ggplot(mtcars) + aes(wt, mpg) + geom_point() +
   theme_minimal()
```

```
## the default
ggplot(mtcars) + aes(wt, mpg) + geom_point() + theme_gray()
## Dark, usually not recommended.
ggplot(mtcars) + aes(wt, mpg) + geom_point() + theme_dark()
## Very traditional
ggplot(mtcars) + aes(wt, mpg) + geom_point() + theme_classic()
## Use if you don't want an axis.
ggplot(mtcars) + aes(wt, mpg) + geom_point() + theme_void()
```

- There are a number of other built in themes, but you get the idea.
- You can also create your own themes if one of the built in ones doesn't do what you want.
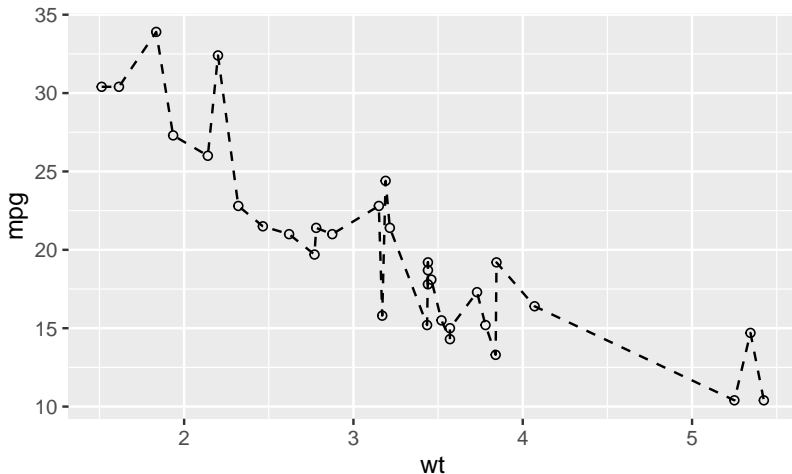
```
car.graph <- ggplot(mtcars) + aes(wt, mpg) +
    geom_point(color="red")
car.graph
```
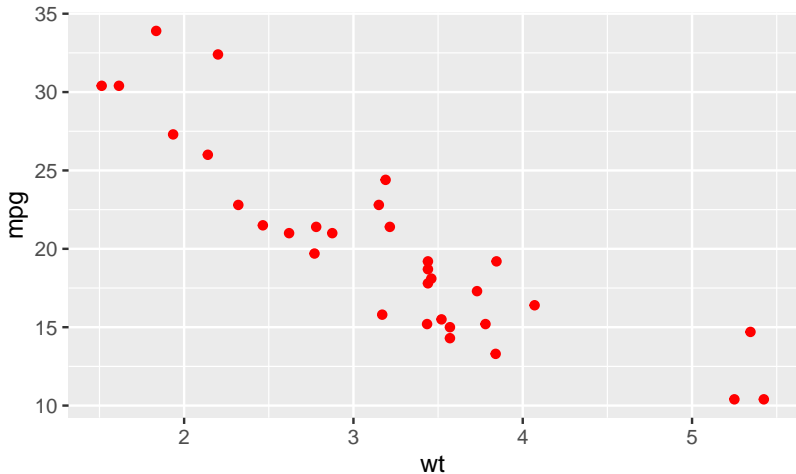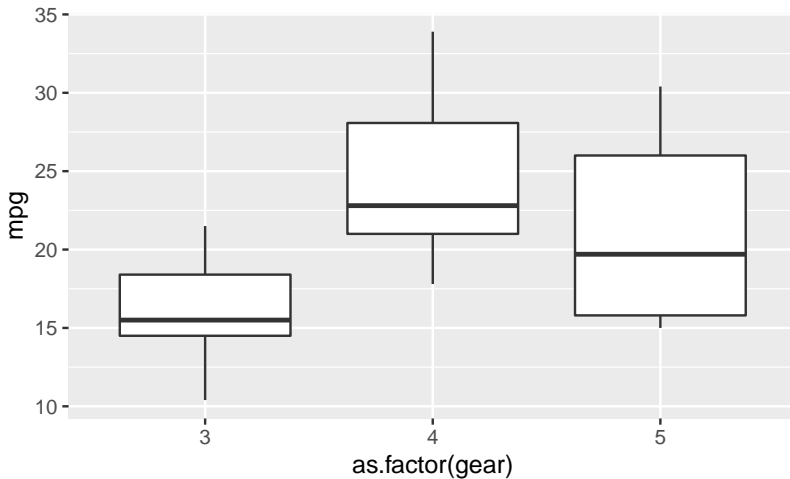
POINT/LINE STYLES.

```
car.graph <- ggplot(mtcars) + aes(wt, mpg) +
    geom_point(shape=21) + geom_line(linetype=2)
car.graph
```

A BOXPLOT

```
ggplot(mtcars) + aes(as.factor(gear), mpg) +geom_boxplot()
```

- geom_text() adds text to a plot.
- geom_label() adds stuff to make the text easier to read (e.g., a box around the text).
- labs() modifies your labels/title.
- theme() lets us manipulate stuff like the inclusion of a legend, its position, etc.

```
ggplot(mtcars) + aes(as.factor(gear), mpg) +
    geom_boxplot() +
    geom_text(aes(label=as.factor(gear), col="red")) +
    geom_label(aes(label=as.factor(gear), col="red"))+
    labs(x="A different label than earlier.", title="A boxplot,
    theme(legend.position="none")
```


A boxplot, with observations labeled according to their nu
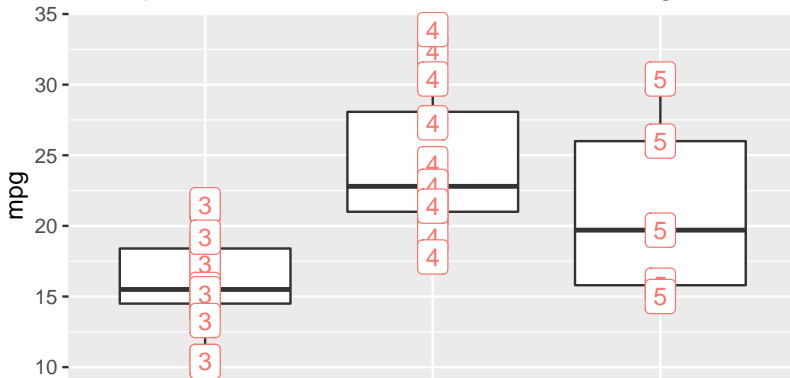
Saving a graph

```
## Saving to pdf
ggsave(car.graph, file="car_graph.pdf")

## Saving to pdf, while specifying dimensions of plot
ggsave(car.graph, file="car_graph.pdf", width = 20,
        height = 20, units = "cm")

## Saving to png
ggsave(car.graph, file="car_graph.png")

## Other formats are possible.
# See ?ggsave for more information.
```
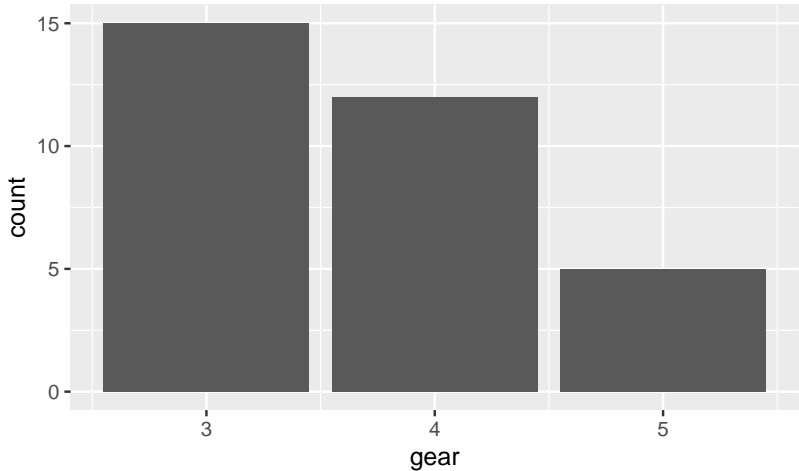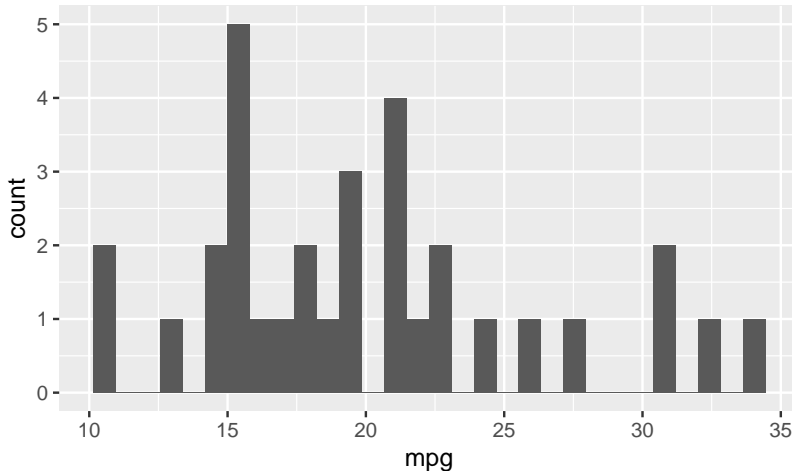
```
## Data + aesthetics + geometry.
ggplot(mtcars)+aes(gear)+geom_bar()
```
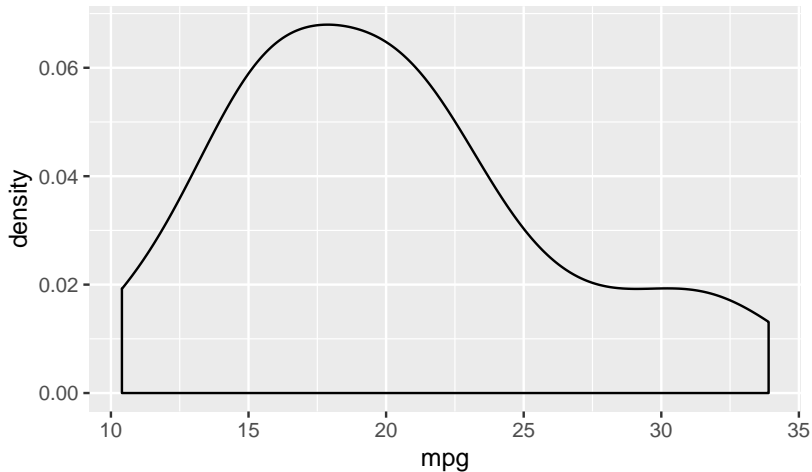
A histogram

```
## Data + aesthetics + geometry.
ggplot(mtcars)+aes(mpg)+geom_histogram()
```

A DENSITY PLOT

```
ggplot(mtcars)+aes(mpg)+geom_density()
```

Using your data from the scatterplot exercise, produce a histogram for cont.var.x, and a density plot for cont.var.y.

- R cookbook for graphs