

Histogram Patterns Density Plots

**Data Science for Quality Management:
Describing Data Graphically**

with **Wendy Martin**

Learning objectives:

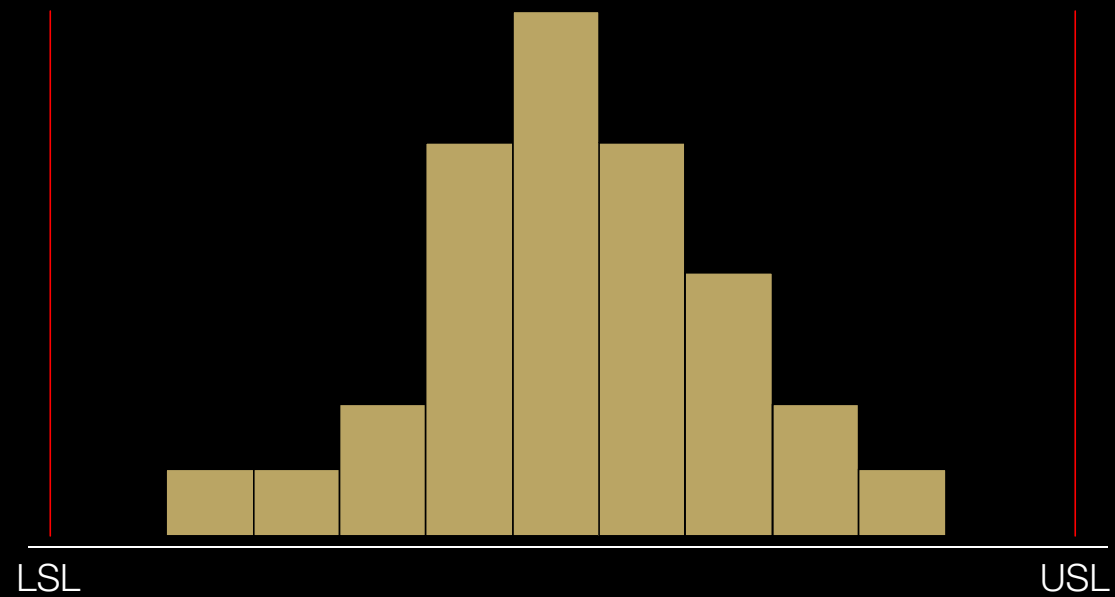
Interpret Histogram Patterns

Create a Density Plot using RStudio

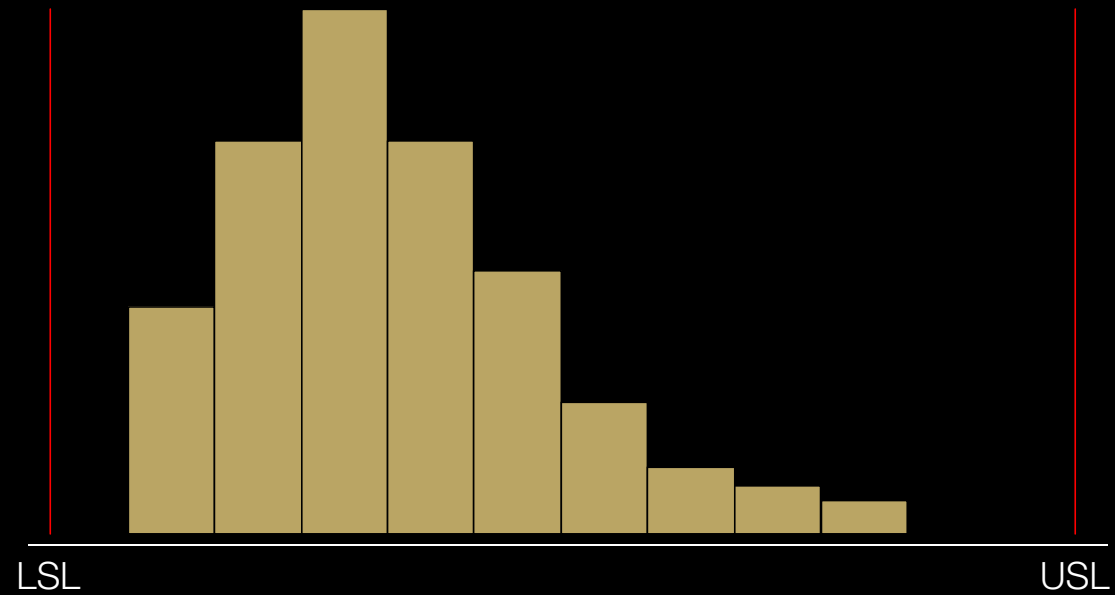
Histogram Patterns

The center, spread and shape of a histogram can give us clues as to what the data are telling us.

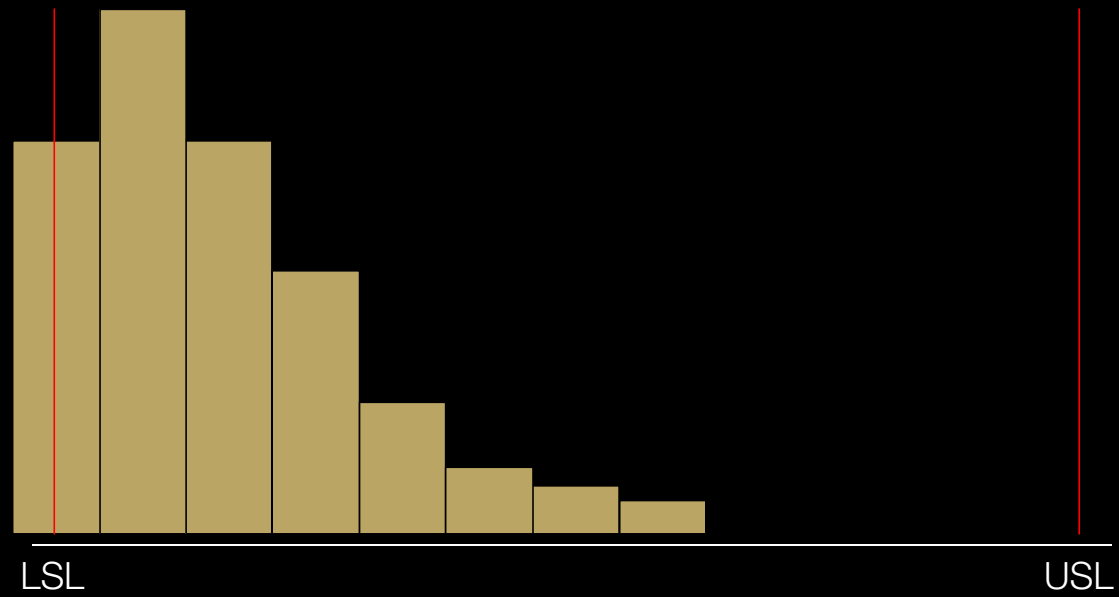
Pattern 1



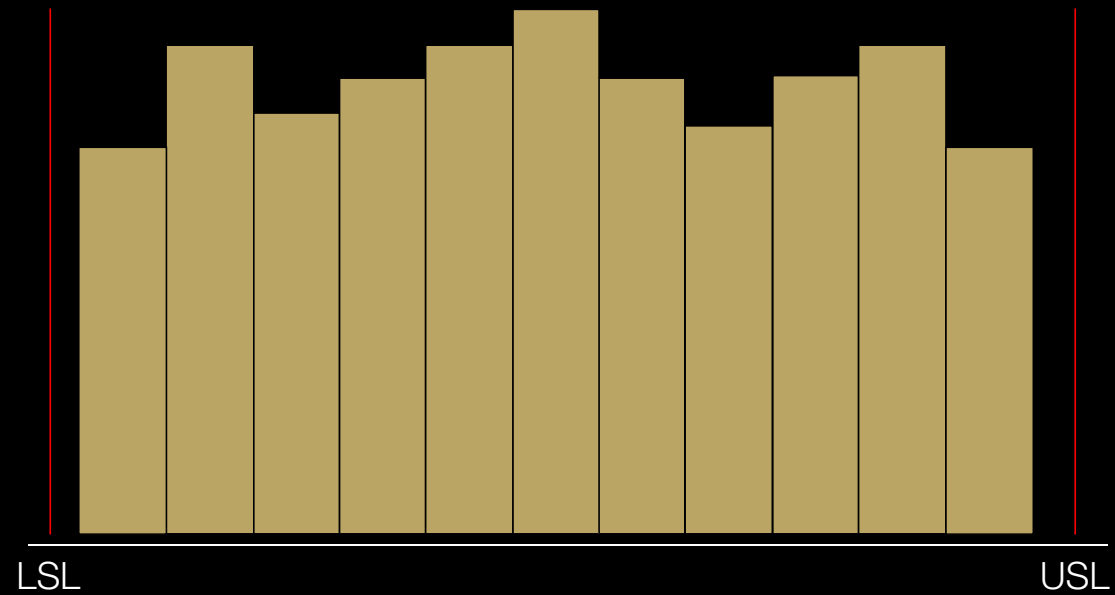
Pattern 2



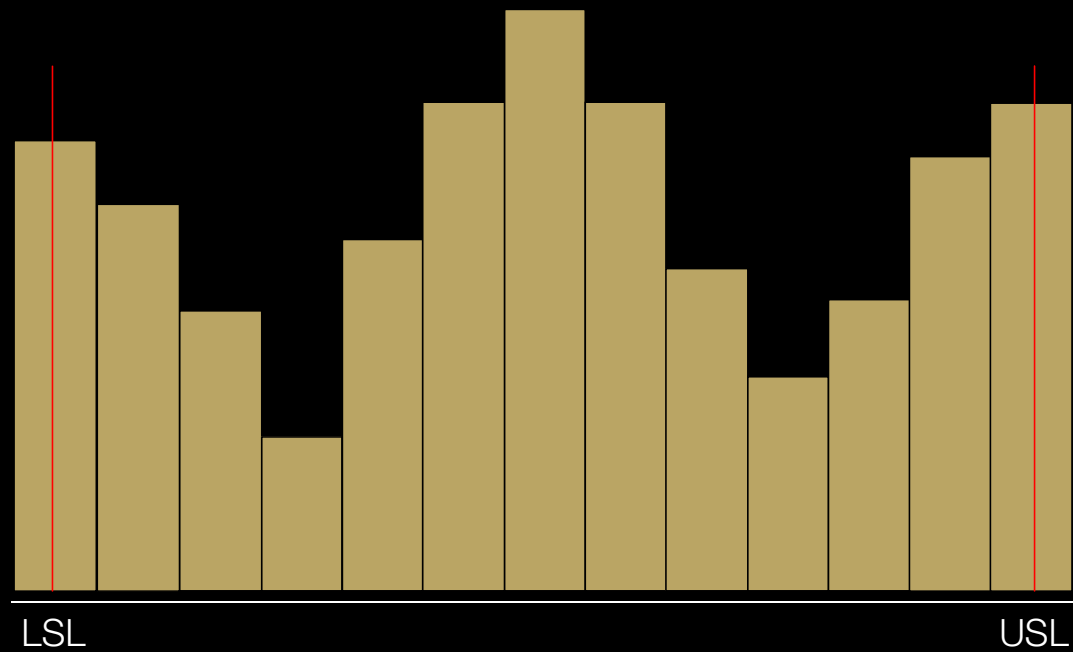
Pattern 3



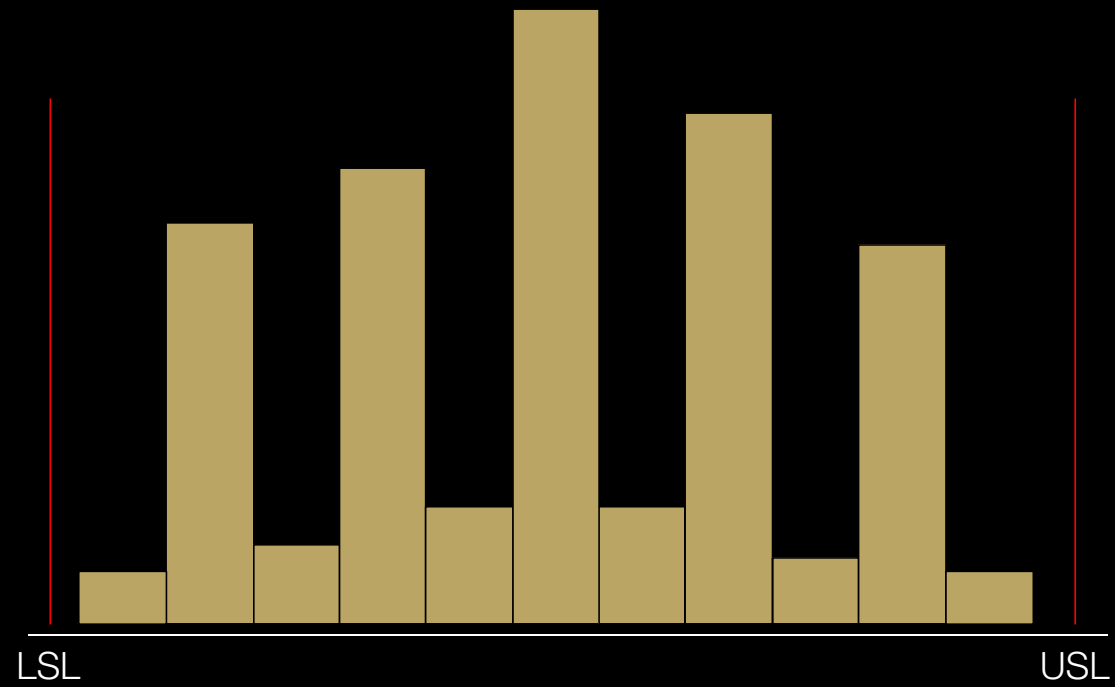
Pattern 4



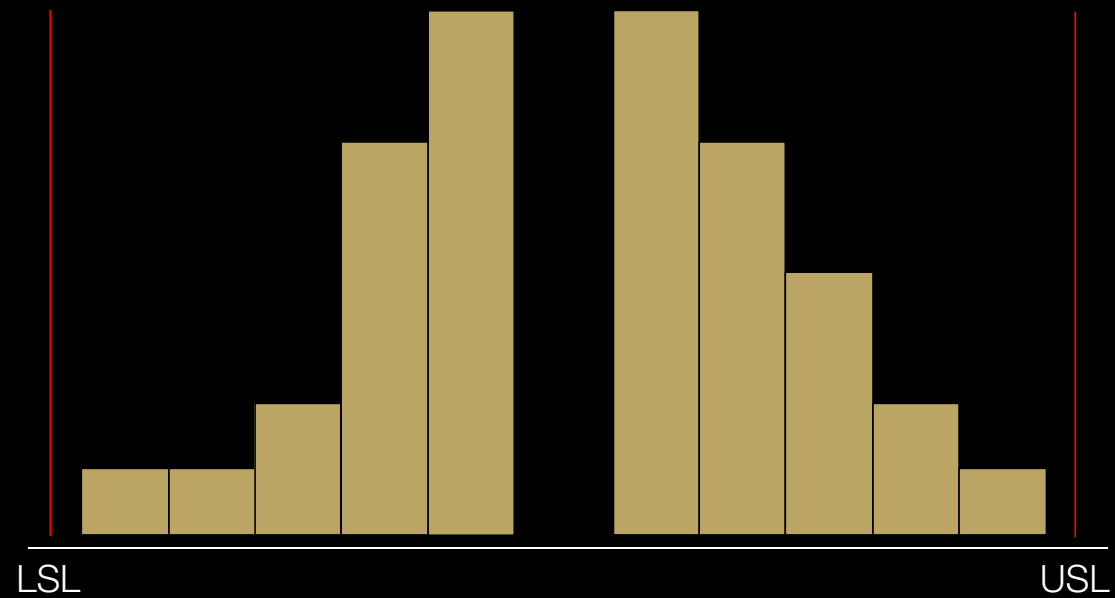
Pattern 5



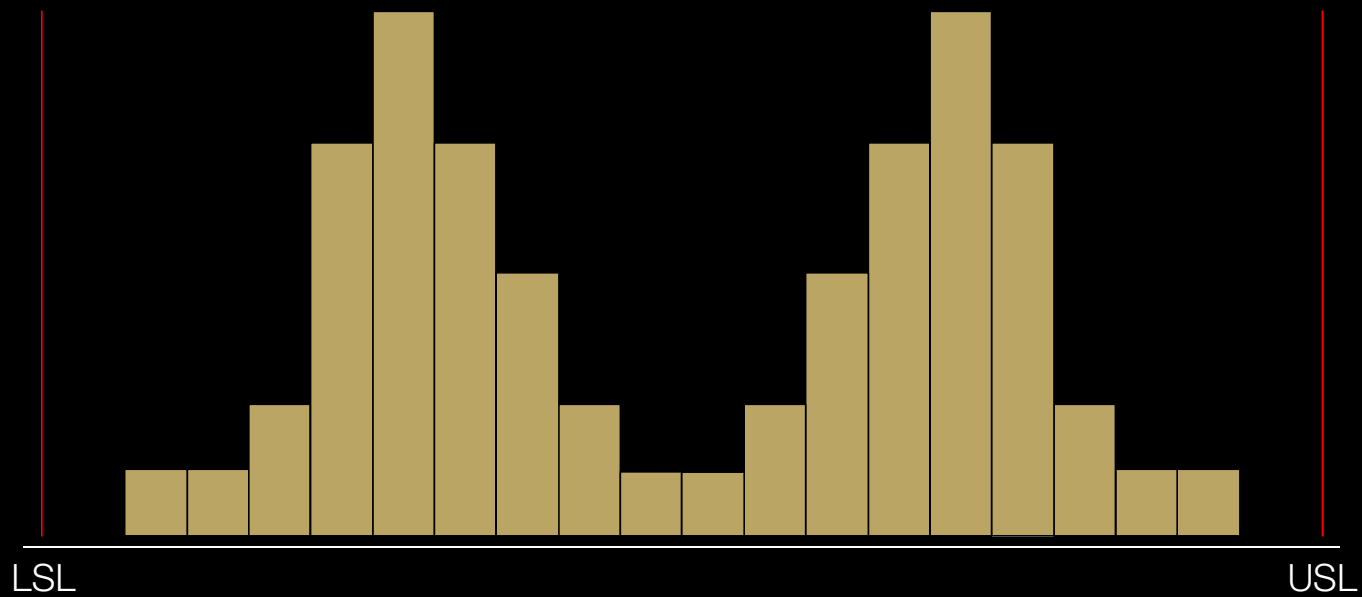
Pattern 6



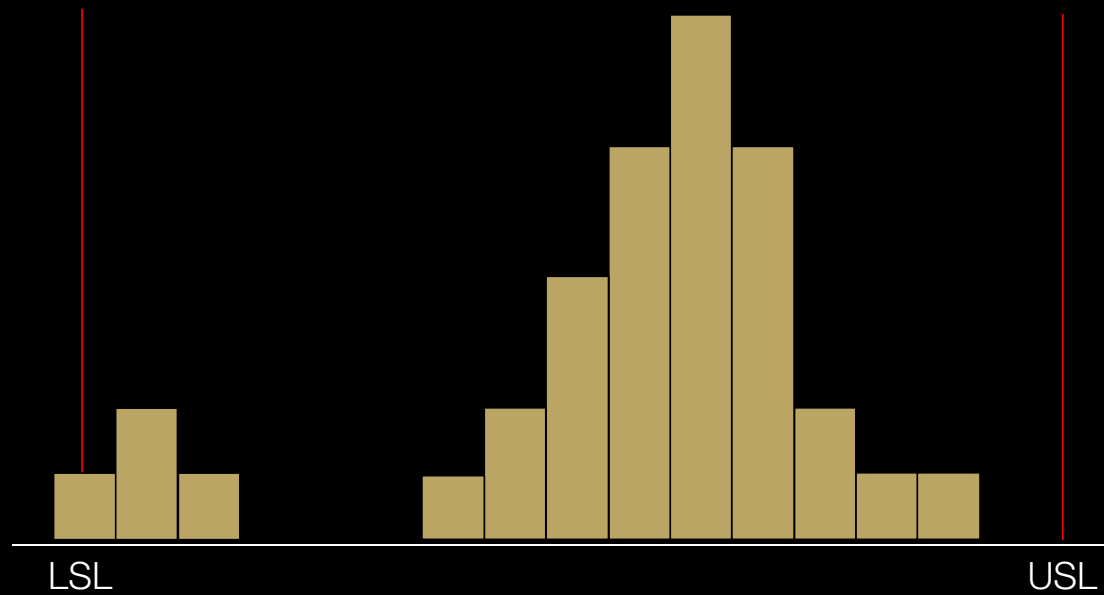
Pattern 7



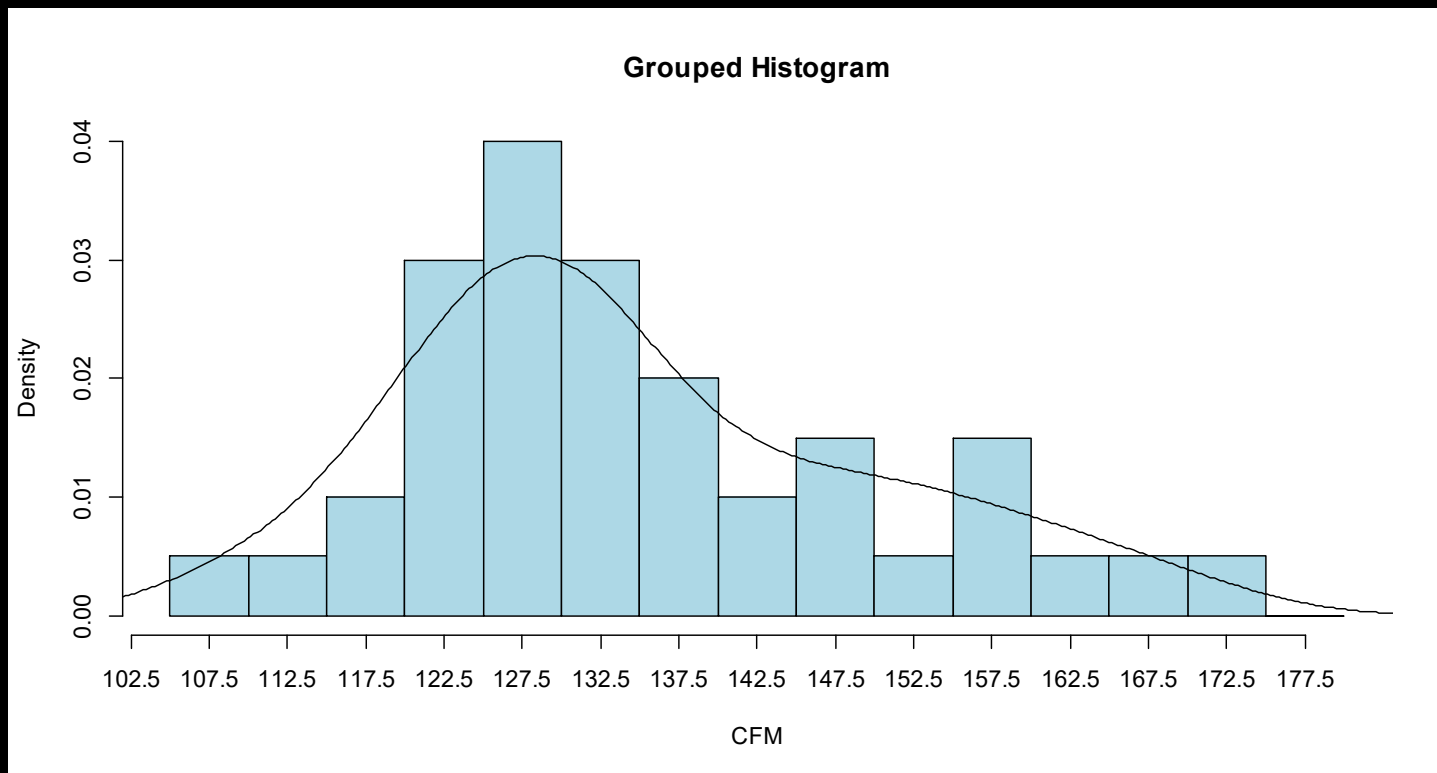
Pattern 8



Pattern 9



Density Plot



Density Plot

Similar to the frequency polygon, in that it is used with continuous data

Used to visualize an underlying probability distribution

Density Plot

When the data are continuous, we can use a density plot over a histogram.

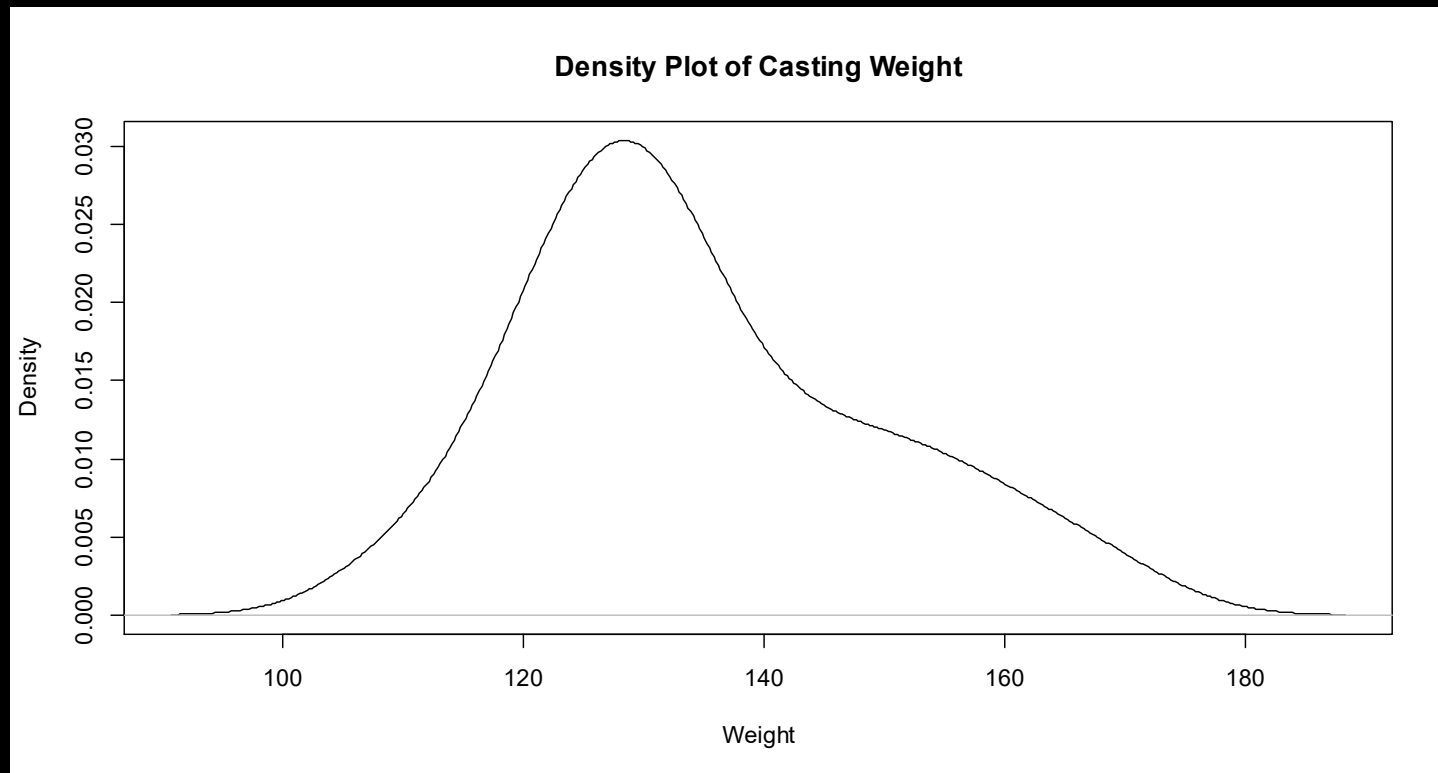
```
> hist.grouped(castings$weight, freq=F)  
> lines(density(castings$weight))
```

Density Plot

The density plot can also be plotted without a histogram:

```
> plot(density(castings$weight))
```


Density Plot

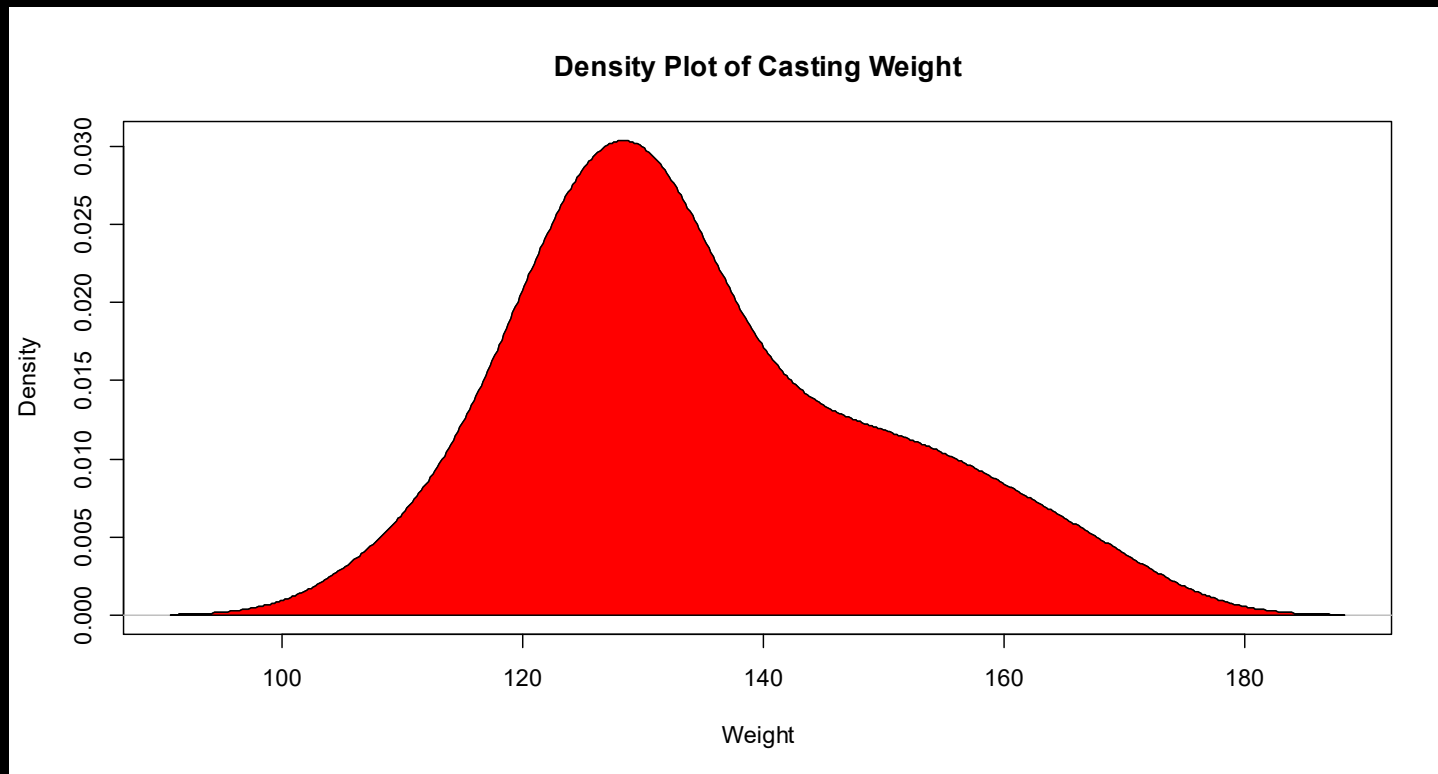


Density Plot

To fill a density plot with color:

```
> dp<-density(castings$weight)
> plot(dp, main="Density Plot of Casting
Weight", xlab="Weight")
> polygon(dp, col="red", border="black")
```

Density Plot



Sources

The material used in the PowerPoint presentations associated with this course was drawn from a number of sources. Specifically, much of the content included was adopted or adapted from the following previously-published material:

- Luftig, J. An Introduction to Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1982
- Luftig, J. Advanced Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1984.
- Luftig, J. A Quality Improvement Strategy for Critical Product and Process Characteristics. Luftig & Associates, Inc. Farmington Hills, MI, 1991
- Luftig, J. Guidelines for Reporting the Capability of Critical Product Characteristics. Anheuser-Busch Companies, St. Louis, MO. 1994
- Spooner-Jordan, V. Understanding Variation. Luftig & Warren International, Southfield, MI 1996
- Luftig, J. and Petrovich, M. Quality with Confidence in Manufacturing. SPSS, Inc. Chicago, IL 1997
- Littlejohn, R., Ouellette, S., & Petrovich, M. Black Belt Business Improvement Specialist Training, Luftig & Warren International, 2000
- Ouellette, S. Six Sigma Champion Training, ROI Alliance, LLC & Luftig & Warren, International, Southfield, MI 2005