`knitr` Extra Credit Practice

Your Name

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Directions: Recreate this document using LaTeX with `knitr`. Make sure that you use `\Sexpr{}` to report your answers. Your document should look like this document when it is knitted including the directions but have your name in place of the current Your Name. Please print (before class) and turn in both the `*.Rnw` file and the knitted `*.pdf` file stapled to the back of your `*.Rnw` file at the start of class 9/18/17. Name your file `firstname_lastname.Rnw` (mine would be `alan_arnholt.Rnw`). Use global options to set the height and width of your figures to 1.5 and 2.5 inches, respectively. My top matter looks like the following:

```
\documentclass{article}
\usepackage[colorlinks=true, linkcolor=blue, citecolor=blue, urlcolor=blue,
linktocpage=true, breaklinks=true]{hyperref}
\usepackage{amsmath}
\usepackage[margin=1in]{geometry}

\begin{document}

\title{\texttt{knitr} Extra Credit Practice}
\author{Your Name}
\maketitle
```

1 Some Code

```
set.seed(13)
x <- rnorm(1000, 100, 10)
xbar <- round(mean(x), 2)
DF <- data.frame(x = x)
library(ggplot2)
ggplot(data = DF, aes(x = x)) +
  geom_histogram(binwidth = 2, fill = "pink", color = "black") +
  theme_bw() +
  labs(title = paste("The mean $\\bar{x} = $", xbar))
```

The mean of the graph shown below is $\bar{x} = 99.97$. The standard deviation of the graph below is $s = 10$. Make sure your answers update properly and are rounded to two decimal places when the value passed to `set.seed()` changes.

```
summary(DF$x)

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  71.55   93.19   99.90   99.97  106.82  135.89
```

The third quartile, Q_3, is 106.82.

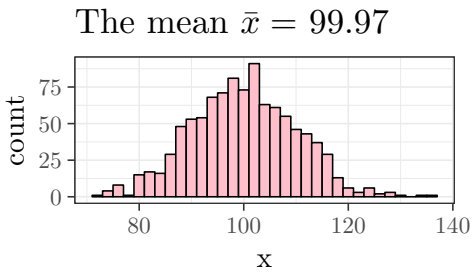


Figure 1: A simulated normal distribution

1.1 A Graph

We can refer to the simulated histogram in Figure 1.

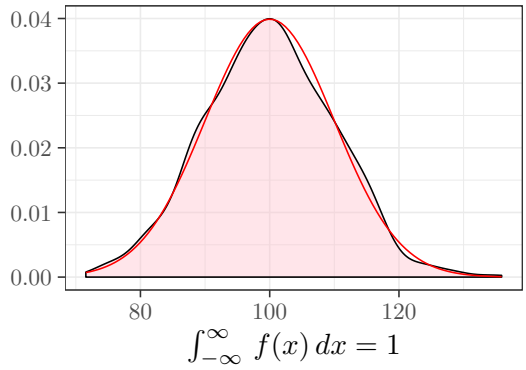
1.2 Additional Resources

- knitr
- LaTeX/Mathematics

1.3 Another Graph

Set the width and height to be 3 and 2 inches, respectively.

```
ggplot(data = DF, aes(x = x)) +
  geom_density(fill = "pink", alpha = 0.4) +
  theme_bw() +
  labs(x = "$\\int_{-\\infty}^{\\infty}\\,f(x)\\,dx = 1$", y = "") +
  stat_function(fun = dnorm, args = list(100, 10), color = "red")
```



1.4 Area Under a Normal

Given $X \sim \mathcal{N}(0, 1)$, find $\mathcal{P}(-1 < X < 1)$. Recall that the density of a Normal distribution is defined in (1).

$$f(x) = \frac{1}{2\pi\sigma^2} e^{-\frac{(x-\mu)^2}{2\sigma^2}}, \quad -\infty < x < \infty. \tag{1}$$

```
ans <- round(pnorm(1) - pnorm(-1), 4)
ans
```

```
[1] 0.6827
```

```
f <- function(x){1/sqrt(2*pi)*exp(-x^2/2)}
ans2 <- integrate(f, -1, 1)$value
round(ans2, 4)
```

```
[1] 0.6827
```

1.5 Shaded Normal

For help getting started read this article. Set the width and height to be 4 and 3 inches, respectively.