R Markdown Extra Credit Practice

Your Name

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Directions: Recreate this document using R Markdown. Make sure that you use inline `R` 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 `*.Rmd` file and the knitted `*.pdf` file stapled to the back of your `*.Rmd` file at the start of class 9/17/17. Name your file `firstname_lastname.Rmd` (mine would be `alan_arnholt.Rmd`). Use global options to set the height and width of your figures to 1.5 and 2.5 inches, respectively.

1 Some Code

```
set.seed(31)
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 $\bar{x} = 100.31$. The standard deviation of the graph below is $s = 10.13$. 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.
  71.78   93.60  100.12  100.31  107.10  128.85
```

The third quartile, Q_3, is 107.1.

1.1 A Graph

We can refer to the simulated histogram in Figure 1.

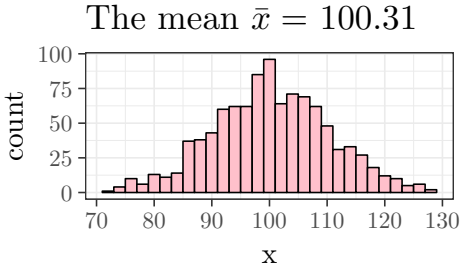


Figure 1: A simulated normal distribution

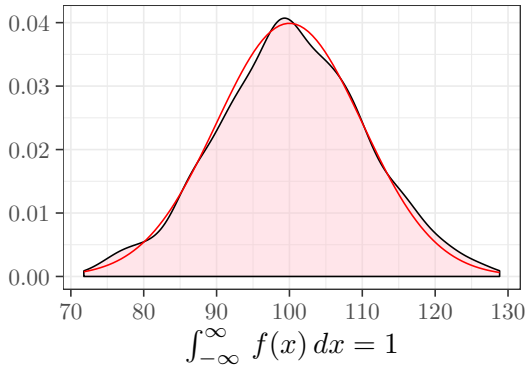
1.2 Additional Resources

- http://rmarkdown.rstudio.com/
- Cheat Sheets
- bookdown

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
```

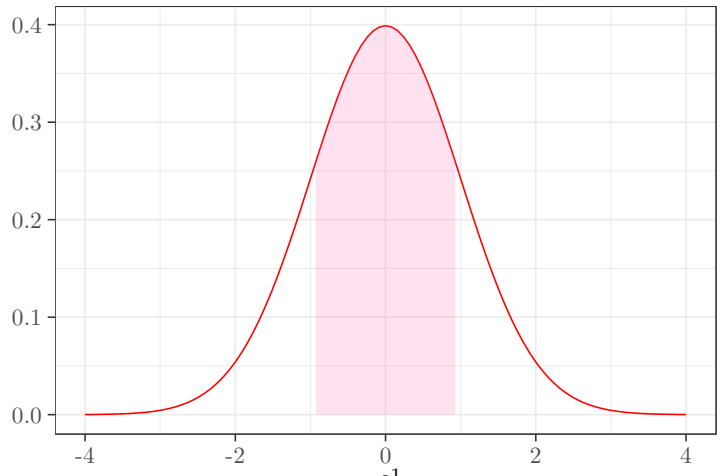
```
f <- function(x){1/sqrt(2*pi)*exp(-x^2/2)}
ans2 <- integrate(f, -1, 1)$value
round(ans2, 4)
```

```
[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.

$X \sim \mathcal{N}(0, 1)$



$\mathcal{P}(-1 < X < 1) = \int_{-1}^{1} f(x)\,dx = 0.6827$