Inference Concepts

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Background

Barrels designed to hold 200-gallons of gasoline were recently found in an abandoned warehouse. The contents of a random sample of 38 barrels were carefully measured to determine if the barrels had leaked a significant amount of gasoline. Assume that it is known that the actual content of the barrels has a standard deviation of 10 gallons. The results for the sample are found in barrels.csv on the class webpage. Use results computed from the sample to determine, at the 10% level, if there is evidence that the barrels had leaked.

Getting the Data

```
> library(NCStats)
> setwd("C:/aaaWork/Web/GitHub/NCMTH107/lecture/HOs")
> brls <- read.csv("Barrels.csv")
> str(brls)
```

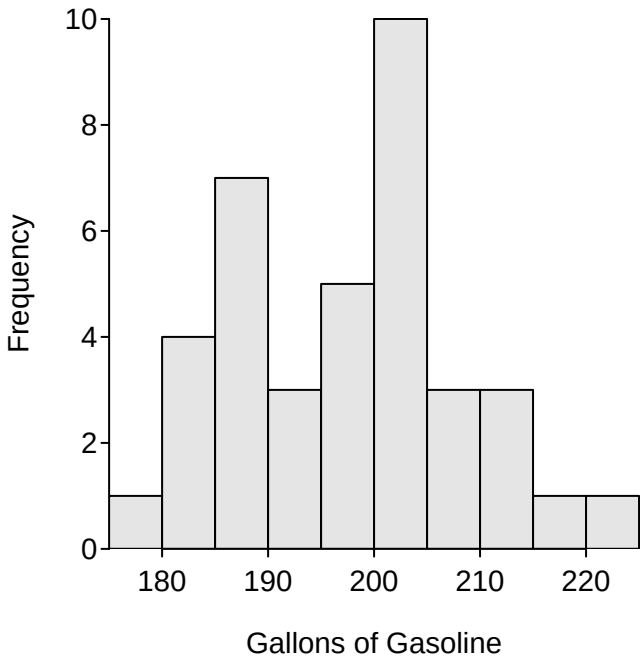
```
'data.frame':   38 obs. of  2 variables:
 $ barrel  : int  1 2 3 4 5 6 7 8 9 10 ...
 $ gasoline: num  183 197 192 200 190 ...
```

Quick EDA

```
> Summarize(~gasoline,data=brls,digits=1)
```

```
       n   nvalid     mean       sd      min       Q1   median       Q3      max percZero
    38.0     38.0    197.7     10.6    178.8    189.5    199.3    204.4    223.4      0.0
```

```
> hist(~gasoline,data=brls,xlab="Gallons of Gasoline")
```

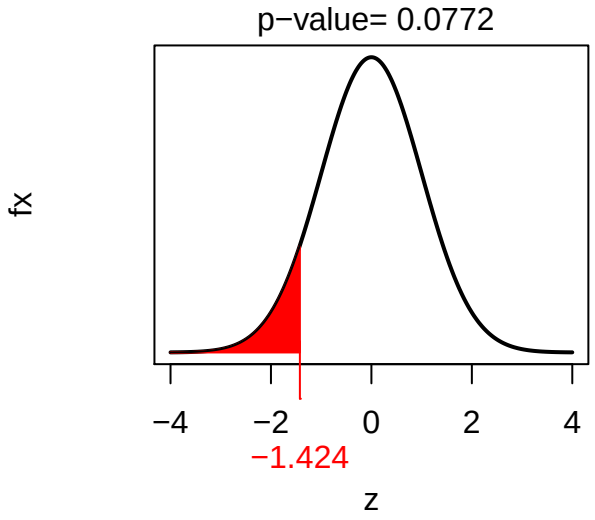


1-Sample Z-test

```
> ( gas.z <- z.test(brls$gasoline,sd=10,mu=200,alt="less",conf.level=0.90) )
```

```
One Sample z-test with brls$gasoline
z = -1.4243, n = 38.000, Std. Dev. = 10.000, Std. Dev. of the sample mean =
1.622, p-value = 0.07718
alternative hypothesis: true mean is less than 200
90 percent confidence interval:
     -Inf 199.7684
sample estimates:
mean of brls$gasoline
             197.6895
```

```
> plot(gas.z)
```


p−value= 0.0772
fx
−4
−2
0
2
4
−1.424
z