SAT Scores Again

- Verbal: t-test and Confidence Interval

```r
> mean(verbal)
[1] 598.49
> t.test(verbal,mu=600)

One Sample t-test
data: verbal
t = -0.1986, df = 99, p-value = 0.843
alternative hypothesis: true mean is not equal to 600
95 percent confidence interval:
583.4042 613.5758
sample estimates:
mean of x
598.49
```

- Verbal: Two-sided Versus One-sided Tests

```r
> t.test(verbal,mu=600,alternative="two.sided")

One Sample t-test
data: verbal
t = -0.1986, df = 99, p-value = 0.843
alternative hypothesis: true mean is not equal to 600
95 percent confidence interval:
583.4042 613.5758
sample estimates:
mean of x
598.49

> t.test(verbal,mu=600,alternative="less")

One Sample t-test
```
data: verbal
t = -0.1986, df = 99, p-value = 0.4215
alternative hypothesis: true mean is less than 600
95 percent confidence interval:
   -Inf 611.1138
sample estimates:
mean of x
   598.49

> t.test(verbal,mu=600,alternative="greater")

        One Sample t-test

data: verbal
t = -0.1986, df = 99, p-value = 0.5785
alternative hypothesis: true mean is greater than 600
95 percent confidence interval:
  585.8662    Inf
sample estimates:
mean of x
   598.49

• Verbal: Changing $\mu$

> t.test(verbal,mu=620)

        One Sample t-test

data: verbal
t = -2.8292, df = 99, p-value = 0.00565
alternative hypothesis: true mean is not equal to 620
95 percent confidence interval:
  583.4042  613.5758
sample estimates:
mean of x
   598.49

> t.test(verbal,mu=620,alternative="less")

        One Sample t-test
data: verbal
t = -2.8292, df = 99, p-value = 0.002825
alternative hypothesis: true mean is less than 620
95 percent confidence interval:
   -Inf 611.1138
sample estimates:
mean of x
   598.49

> t.test(verbal,mu=620,alternative="greater")

   One Sample t-test

data: verbal
t = -2.8292, df = 99, p-value = 0.9972
alternative hypothesis: true mean is greater than 620

• Math: Confidence Interval and t-test

> t.test(math)

   One Sample t-test

data: math
t = 99.6647, df = 99, p-value = < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
  641.0874 667.1326
sample estimates:
mean of x
  654.11

• Two-sample t-test for Math and Verbal

> t.test(math,verbal,mu=0)

   Welch Two Sample t-test

data: math and verbal
t = 5.5377, df = 193.867, p-value = 9.88e-08
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  35.81078  75.42922
sample estimates:
mean of x mean of y
   654.11    598.49

> t.test(math,verbal,mu=0,alternative="greater")

       Welch Two Sample t-test

data:  math and verbal
  t = 5.5377, df = 193.867, p-value = 4.94e-08
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
     39.02003     Inf
sample estimates:
mean of x mean of y
   654.11    598.49

> t.test(math,verbal,mu=0,alternative="less")

       Welch Two Sample t-test

data:  math and verbal
  t = 5.5377, df = 193.867, p-value = 1
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
    -Inf     72.21997
sample estimates:
mean of x mean of y
   654.11    598.49

> t.test(math,verbal,mu=50)

       Welch Two Sample t-test

data:  math and verbal
  t = 0.5595, df = 193.867, p-value = 0.5764
alternative hypothesis: true difference in means is not equal to 50
95 percent confidence interval:
  35.81078 75.42922
sample estimates:
mean of x mean of y
  654.11  598.49