**STAT 40001/MA59800 Statistical Computing Fall 2013**

**In class work -9**

1. Thirteen Honda Accord are chosen to study the gas mileage. Below is the mpg for these vehicles.

27 26 31 32 30 28 26 24 31 30 23 30 23

1. Test the hypothesis that the variance is not equal to 10.

> library(TeachingDemos)

> x=c(27 , 26 ,31 , 32 , 30 , 28, 26 , 24 , 31 , 30 ,23 , 30 , 23)

> sigma.test(x,sigmasq=10)

One sample Chi-squared test for variance

data: x

X-squared = 12.0308, df = 12, p-value = 0.8864

alternative hypothesis: true variance is not equal to 10

95 percent confidence interval:

5.155308 27.319135

sample estimates:

var of x

10.02564

1. Construct a 90% confidence interval for the population variance

>sigma.test(x,sigmasq=10,conf.level=0.9)

One sample Chi-squared test for variance

data: x

X-squared = 12.0308, df = 12, p-value = 0.8864

alternative hypothesis: true variance is not equal to 10

90 percent confidence interval:

5.721835 23.020860

sample estimates:

var of x

10.02564

#or

> > round(c(12\*10.02564/qchisq(0.95, 12), 12\*10.02564/qchisq(0.05,12)),2)

[1] 5.72 23.02

1. Construct a 90% confidence Interval for the population standard deviation.

> round(c((12\*10.02564/qchisq(0.95, 12))^0.5, (12\*10.02564/qchisq(0.05,12))^0.5),2)

[1] 2.39 4.80

1. The following data gives SAT mean scores for math by state for 1989 and 1999 for randomly selected 16 states (Source: The World Almanac and book of facts 2000).

**State 1989 1999**

Arizona 523 525

Connecticut 498 509

Alabama 539 555

Indiana 487 498

Kansas 561 576

Oregon 509 525

Nebraska 560 571

New York 496 502

Virginia 507 499

Washington 515 526

Illinois 539 585

North Carolina 469 493

Georgia 475 482

Nevada 512 517

Ohio 520 568

New Hampshire 510 518

Assuming that the samples comes from a normal distribution,

1. Test that the mean SAT score for math in 1999 is greater than that in 1989 at. Assume the variances are equal.

> x1=c(523,498,539,487,561,509,560,496,507,515,539,469,475,512,520,510)

> x2=c(525,509,555,498,576,525,571,502,499,526,585,493,482,517,568,518)

> t.test(x1,x2,alternative="less",var.equal=TRUE)

Two Sample t-test

data: x1 and x2

t = -1.3561, df = 30, p-value = 0.09259

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

-Inf 3.600752

sample estimates:

mean of x mean of y

513.7500 528.0625

(b) Test for the equality of the variances at.

> var.test(x1,x2)

F test to compare two variances

data: x1 and x2

F = 0.6612, num df = 15, denom df = 15, p-value = 0.4324

alternative hypothesis: true ratio of variances is not equal to 1

95 percent confidence interval:

0.2310274 1.8924778

sample estimates:

ratio of variances

0.6612217