

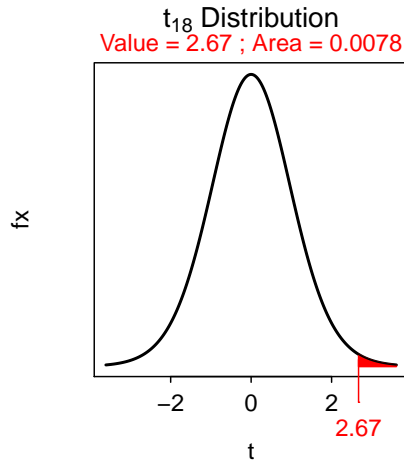
First Commands

```
> library(NCStats)
> setwd("C:/aaaWork/Class Materials/MTH107/Lecture/H0s")
```

t Distribution Calculations

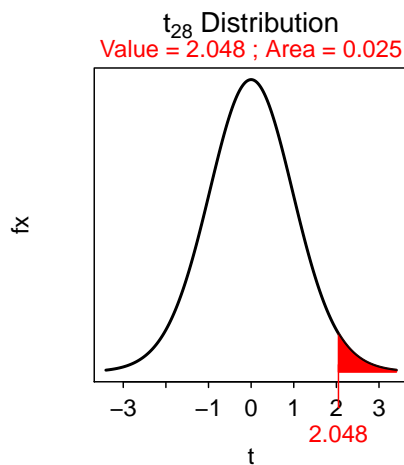
An example of computing the p-value if $H_A : \mu > 70$, $t=2.67$, and $df=18$.

```
> ( distrib(2.67,distrib="t",df=18,lower.tail=FALSE) )
[1] 0.007807
```



An example of finding t^* if $H_A : \mu \neq 70$, $\alpha=0.05$, and $df=28$.

```
> ( distrib(0.025,distrib="t",df=28,type="q",lower.tail=FALSE) )
[1] 2.048
```

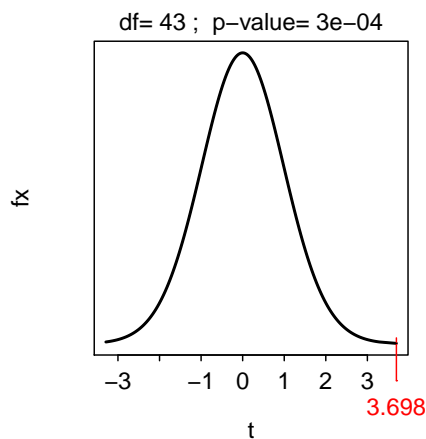


One-Sample t-Test

Researchers¹ have determined that a population of cottonmouth snakes (*Agkistrodon piscivorus*) must have an average litter size of greater than 5.8 snakes in order for the population to grow. A sample of snake litters from this population was taken and the number of snakes in the litter was recorded. The results were recorded in [Cottonmouth.txt](#) on the class webpage. Test, at a very conservative level, if the average litter size is large enough for the population to grow.

```
> cm <- read.table("Cottonmouth.txt",header=TRUE)
> str(cm)
'data.frame': 44 obs. of 1 variable:
 $ num: int  5 12 7 7 6 8 12 9 7 4 ...
> # if n was <40 then I would have done -- hist(cm$num,xlab="Number in Litter")
> ( cm.t <- t.test(cm$num,mu=5.8,alt="greater",conf.level=0.99) )

One Sample t-test with cm$num
t = 3.699, df = 43, p-value = 0.0003055
alternative hypothesis: true mean is greater than 5.8
99 percent confidence interval:
 6.342      Inf
sample estimates:
mean of x
 7.364
> plot(cm.t)
```



¹Based on data from Blem, C.R. and L.B. Blem. 1995. Journal of Herpetology 29:391-398.

Two-Sample t-Test

A sample² of 30 males and 30 female was taken to an unfamiliar wooded park and given spatial orientation tests, including pointing to the south. The absolute pointing error, in degrees, was recorded. The results are in the `SexDirection.txt` on the class webpage. Test if men have a better sense of direction than women, at the 1% level?

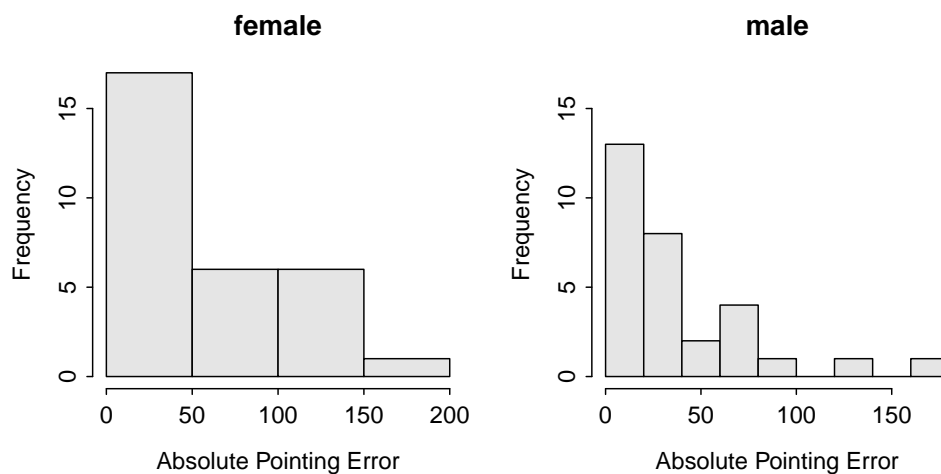
```
> sdir <- read.table("SexDirection.txt",header=TRUE)
> str(sdir)

'data.frame': 60 obs. of 2 variables:
 $ abserr: int 13 13 38 59 58 8 130 68 23 5 ...
 $ sex : Factor w/ 2 levels "female","male": 2 2 2 2 2 2 2 2 2 2 ...
```

```
> Summarize(abserr~sex,data=sdir,digits=1)

  sex  n mean  sd min  Q1 median  Q3 max percZero
1 female 30 55.8 48.3 3 15.8 35.0 88.2 176 0
2 male 30 37.6 38.5 3 11.5 22.5 58.8 167 0

> hist(abserr~sex,data=sdir,xlab="Absolute Pointing Error")
```



```
> leveneTest(abserr~sex,data=sdir)

      Df F value Pr(>F)
group 1    2.17  0.15
      58
```

²from Sholl, M.J., et al. 2000. The relation of sex and sense of direction to spatial orientation in an unfamiliar environment. *Journal of Environmental Psychology*. 20:17-28.

```

> ( t2 <- t.test(abserr~sex,data=sdir,var.equal=TRUE,alt="greater",conf.level=0.99) )

Two Sample t-test with abserr by sex
t = 1.615, df = 58, p-value = 0.05588
alternative hypothesis: true difference in means is greater than 0
99 percent confidence interval:
 -8.761      Inf
sample estimates:
mean in group female    mean in group male
          55.8              37.6

> plot(t2)

```

