[HW3: Confidence Interval and F-distribution]

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Exercise 1:

```
#The increase was significant as the 95% confidence interval did not contain .54 in its bounds.
n=2253
zalpha=qnorm(1-.05/2,0,1)

xbar=1420/2253
upperbound=xbar+zalpha*sqrt(xbar*(1-xbar)/n)
lowerbound=xbar-zalpha*sqrt(xbar*(1-xbar)/n)
c(lowerbound,upperbound)
```

```
## [1] 0.6103377 0.6502038
```

Exercise 2:

```
n=1015
zalpha=qnorm(1-.1/2,0,1)
xbar=281/1015
xbar
```

```
## [1] 0.2768473
```

```
upperbound=xbar+zalpha*sqrt(xbar*(1-xbar)/n)
lowerbound=xbar-zalpha*sqrt(xbar*(1-xbar)/n)
c(lowerbound,upperbound)
```

```
## [1] 0.2537464 0.2999482
```

Exercise 3:

```
n=6
zalpha=qnorm(1-.05/2,0,1)
sigma=8
xbar=mean(c(52,69,73,88,87,56))
upperbound=xbar+zalpha*sigma/sqrt(n)
lowerbound=xbar-zalpha*sigma/sqrt(n)
c(lowerbound,upperbound)
```

```
## [1] 64.43212 77.23455
```

```
#According to the confidence interval it is not believable that males and females metabolize methylmercury a
t the same rate. Because the number 80 is not in the 95% confidence interval for woman.
```

Exercise 4:

```
#Twain= muX  QCS=muY
#Construct 95% CI for muX-muY
alpha=.05
ybar=c(.209,.205,.196,.210,.202,.207,.224,.223,.220,.201)

xbar=c(.225,.262,.217,.240,.230,.229,.235,.217)

n=length(xbar)
m=length(ybar)

s2x=var(xbar)
s2y=var(ybar)

xbar=mean(xbar)
ybar=mean(ybar)

Sp2=((n-1)*s2x+(m-1)*s2y)/(n+m-2)
Sp2
```

```
## [1] 0.0001453109
```

```
talpha=qt(1-alpha/2,m+n-2)
lower=xbar-ybar-talpha*sqrt(Sp2)*sqrt(1/m+1/n)
upper=xbar-ybar+talpha*sqrt(Sp2)*sqrt(1/m+1/n)
c(lower,upper)
```

```
## [1] 0.01005349 0.03429651
```

```
# Since the confidence interval does not contain 0 we can conclude that they are different people.
```

Exercise 5:

```
# Done in other PDF
```

Exercise 6:

```
Democ=c(22.4,24.0,38.0,45.7,21.2,17.9,38.2,33.7,23.8)
Repub=c(45.7,28.6,14.2,18.8,50.3,40.1,52.4)

n=length(Democ)
m=length(Repub)

s2x=var(Democ)
s2y=var(Repub)

xbar=mean(Democ)
ybar=mean(Repub)

theta=s2x/s2y

v=((theta+n/m)^2)/((theta^2)/(n-1)+(1/(m-1))*((n/m)^2))
v
```

```
## [1] 9.584532
```

```
talpha=qt(1-alpha/2,10)

lower=xbar-ybar-(talpha)*(sqrt(s2x/n+s2y/m))
upper=xbar-ybar+(talpha)*(sqrt(s2x/n+s2y/m))
c(lower,upper)
```

```
## [1] -21.059086   8.468609
```

Exercise 7:

```r
#Find P(1<=F<=2.5)
pf(2.5, df1=20, df2=15)-pf(1, df1=20, df2=15)
```

```
## [1] 0.4716361
```

```r
#Find P(F>=1)
1-pf(1, df1=20, df2=15)
```

```
## [1] 0.5092495
```

```r
#b
#Find 5th percentile
qf(0.05, df1=20,df2=15)
```

```
## [1] 0.45387
```

```r
#Find 10th percentile
qf(0.1, df1=20,df2=15)
```

```
## [1] 0.5420245
```

```r
#Find 90th percentile
qf(0.9, df1=20,df2=15)
```

```
## [1] 1.924314
```

```r
#Find 95th percentile
qf(0.95, df1=20,df2=15)
```

```
## [1] 2.327535
```

```r
#Find 99th percentile
qf(0.99, df1=20,df2=15)
```

```
## [1] 3.371892
```

```r
#c
#Plot the graph on the interval [0,10]
curve(df(x,20,15),0,10,main="F-distribution with (20,15) df",ylab="Probability")
```