STA2023 Hypothesis testing in R

ONE SAMPLE TESTS

Proportions:

```
> prop.test(557,1000,0.52,alternative = "two.sided", correct=F) # Function by   default
in R

        1-sample proportions test without continuity correction

data:  557 out of 1000, null probability 0.52
X-squared = 5.4848, df = 1, p-value = 0.01918
alternative hypothesis: true p is not equal to 0.52
95 percent confidence interval:
 0.5260523 0.5875114
sample estimates:
    p
0.557
```

For functions in RED tails refers to 1, for left or right; 2 for two sided, or two tails.

```
> #Z test proportions: Using the formulas,  kind of textbook method. The one whose a
nswers match MyMathLab requirements. USE THIS FORMULA or the prop.test and take the
square root of the X-squared in order to find the Test Statistic
--Formulas yield the Test Statistics, followed by the p-value.

> z.test.prop.pvalue<-function(x, n, p, tails){
+                     z=(x/n - p)/sqrt(p*(1-p)/n)
+  if (z<0) {pv=pnorm(z, lower.tail = T)} else {pv=pnorm(z,lower.tail = F)}
+                               z<-round(z, 2)
+                               v1<-c(z, pv)
+                               v2<-c(z, 2*pv)
+                               if(tails==1) {return(v1)}
+                               if(tails==2) {return(v2)}
+ }

> z.test.prop.pvalue(557,1000,0.52,2)
[1] 2.34000000 0.01918278
```

Means: Z test [sigma known]: Textbook, Homework.

```
> #Z test means
> z.test.pvalue<-function(xbar, mu, sigma, n, tails){
+                                      z=(xbar-mu)*sqrt(n)/sigma
+    if (z<0) {pv=pnorm(z, lower.tail = T)} else {pv=pnorm(z,lower.tail = F)}
+                                                 z<-round(z,2)
+                                                 v1<-c(z, pv)
+                                                 v2<-c(z, 2*pv)
+                                                 if(tails==1) {return(v1)}
+                                                 if (tails==2) {return(v2)}
+                                                    }


> z.test.pvalue(9.5,10,0.8,20,2) # Example
[1] -2.800000000  0.005188608
```

Means: T test [sigma not known, or whenever sample data is available]

```
> # t test means
> t.test.pvalue<-function(xbar, mu, s, n, tails){
+               t=(xbar-mu)*sqrt(n)/s
+ if (t<0) {pv=pt(t, n-1,lower.tail = T)} else {pv=pt(t, n-1,lower.tail = F)}
+                    t<-round(t,2)
+                    v1<-c(t, pv)
+                    v2<-c(t, 2*pv)
+                    if(tails==1) {return(v1)}
+                    if (tails==2) {return(v2)}
+ }

> t.test.pvalue(57,60,3.0,20,2)#example t test with summary
[1] -4.4700000000  0.0002611934


> # t. test  given raw data

> x<-c(20,19,18,20.3,21,23,20.1,19.1,18.1,18.7
> #hyp mu=20.6; two tailed test;
> t.test(x, mu=20.6, alt="two.sided")

        One Sample t-test

data:  x
t = -1.8237, df = 9, p-value = 0.1015
alternative hypothesis: true mean is not equal to 20.6
95 percent confidence interval:
 18.65086 20.80914
sample estimates:
mean of x
    19.73
```

TWO SAMPLES TESTS:

Two proportions:

```
>#prop.test(x=c(x1,x2), n=c(n1,n2), alternative="*", correct=F, conf.level= )

*alternative ="less" for less than < in H1.
 alternative ="greater" for greater than >in H1
 alternative ="two.sided" for not equal  ≠ in H1
```

Two Samples T TEST:

```
>install.packages("BSDA")
>require(BSDA)
>#tsum.test(mean1,s1,n1,mean2,s2,n2,alternative="*",conf.level=  ) # with summary
stat

>#  t.test(x, y , alternative = " * " mu =0,   paired = FALSE, var.equal = FALSE,
conf.level = ) # where x and y are vectors of raw data.
>x<-c(495,760,556,904,520,1005,743,660)# question 6 on Practice 9
>y<-c(722,562,880,520,500,1250,750,1640,518,904,1150,805,480,970,605)

> t.test(x, y , alternative ="less", mu =0, paired = FALSE, var.equal = FALSE)

        Welch Two Sample t-test

data:  x and y
t = -1.0419, df = 20.889, p-value = 0.1547
alternative hypothesis: true difference in means is less than 0
```