Practice 8 in R

Questions 1, 2 & 3, definitions and concepts. No calculations.

```
> # critical values qnorm (alpha/2) for two tailed tests; for one tailed test
qnorm(alpha). for right tailed, +
```

Question 4:

```
> qnorm(0.05/2) # Two tailed test Ans is + and -
[1] -1.959964
```

Question 5:

```
> # right talies: ans is positive. Or, instead, find qnorm of 1-alpha.
> qnorm(0.09)
[1] -1.340755
```

Question 6:

```
> qnorm(0.05) # for left, answer is -
[1] -1.644854
```

Question 7:

```
> # Ho: p=0.25, H1 p>0.25; x=172, n=575
> #Z test proportions
> 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(x=172, n=575, p=0.25, 1)
[1] 2.720000000 0.003256993
> # the answer is z=2.72
```

Question 8:

```
> # Ho: p=0.10  H1: p>0.10  x= 15% of 800, n=800.
> 0.15*800
[1] 120
> z.test.prop.pvalue(x=120, n=800, p=0.10, 1)
[1] 4.710000e+00 1.214234e-06
> # test stat is z=4.71;pvalue= 1.21 x 10^-6  which = 0.000001214234
```

Questions 9, 10, 11 & 12, definitions and concepts. No calculations.

Question 13:

```
> #Ho; p=0.03 H1: p>0.03 x=5.9% of 85   n=85
> 0.059*85 # formula requires the x value. Not given here: x= n. p =0.059*85
[1] 5.015
> z.test.prop.pvalue(x=5, n=85, p=0.03, 1) # x=5.015 round down to 5.
[1] 1.560000 0.059641
```

```
> # test stat z=1.56   pvalue=0.0296 > alpha (0.01, significance level).
> # Conclusions: we fail to reject Ho. There is not sufficient evidence to re
ject the Null Hypothesis. We support the manager's claim that production
under control
```

Question 14:

```
> 1068*.48 # Aain, x value not given: x= n. p =1068*.48
[1] 512.64
> # round up  x=513
> #Z test proportions
> z.test.prop.pvalue(x=513, n=1068, p=0.5, 1) # recall: tails = 1 for  < or >
It is = 2 when H1 uses not equal to symbol.
[1] -1.29000000  0.09936485
> # test statistics: z=-1.29;pvalue=0.0994; pvalue>alpha(significance level)
which in this problem =0.05
> # Conclusions: 5. Fail to reject null hypothesis. There is not sufficient
evidence to warrant rejection of the claim that at least half of all voters p
refer the Democrat.
```

Question 15:

```
> # t test means
>#15 Ho: mu=32.6 H1; mu != 32.6  ( != means not equal to) xbar=41.6 s=8, n=15
> 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(41.6,32.6,8,15,2) # you may specify the variables as follow:
[1] 4.3600000000 0.0006569237
> t.test.pvalue(xbar=41.6,mu=32.6,s=8,n=15,tails=2) # you may specify the
variables. Same result.
[1] 4.3600000000 0.0006569237

> # test stat t=4.36 pvalue =0.0006569237 < alpha (0.05)
> # Conclusions: Reject Null. There is sufficient evidence to warrant
rejection of the claim that the mean = 32.6
```

Question 16:

```
> # Ho: mu=2.85  H1: mu > 2.85  alpha = 0.01  xbar=3.19  s=0.55 n=9
> t.test.pvalue(xbar=3.19,mu=2.85,s=0.55,n=9,tails=1)
[1] 1.85000000 0.05038555
> # test stat  t=1.85; pvalue=0.0504 > alpha. Fail to reject.
> # Conclusions: There is not sufficient evidence to support the claim that
the mean is greater than 2.85
```

Question 17:

```
> # whenever raw data is given, use t.test function

> # Ho: mu=14  H1; mu != 14  alpha = 0.01  We are given raw data. Enter data
as a vector of values, as follows:
> x<-c(14.6,13.8,14.1,13.7,14.0,14.4,13.6,14.2)
> t.test (x, mu=14, alternative = "two.sided" )

        One Sample t-test

data:  x
t = 0.40825, df = 7, p-value = 0.6953
alternative hypothesis: true mean is not equal to 14
95 percent confidence interval:
 13.76039 14.33961
sample estimates:
mean of x
    14.05

> # test stat   t=0.408,  pvalue=0.6953  > alpha. Fail to reject Ho.
> # Conclusions: There is not sufficient evidence to warrant rejection of the
claim that the mean weight is 14 ounces
```

Question 18:

```
> # Ho: mu=132  H1: mu !=132  alpha = 0.10  xbar =137  s=14.2  n=20
> t.test.pvalue(xbar=137,mu=132,s=14.2,n=20,tails=2)
[1] 1.5700000 0.1318312
> #Test stat t=1.57  pvalue=0.1318 > alpha Fail to reject Ho.
> # Conclusions: There is not sufficient evidence to warrant rejection of the
claim that mu = 132 lb.
```

Question 19.

```
> # whenever sigma is given, use z.test.pvalue function:

 > # Ho: mu=22  H1: mu != 22  alpha = 0.05  xbar =20  sigma=1.5 n=60
 > #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)
 +                                                    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(xbar=20, mu=22, sigma=1.5, n=60, tails=2)
 [1] -1.033000e+01  5.267119e-25

 > # test Stat z=-1.03 pvalue apprx 0 Pvalue < alpha, Reject Ho.
 > # Conclusions: There is sufficient evidence to warrant rejection of the claim
 that the population mean temperature is 22C.
```