Review 3 in R:

Question 7:

```
> #7
> # Ho: p=0.53  H1; p !=0.53  alpha =0.10  x= 45% of 100 = 45  n=100
> #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(45, 100, 0.53, 2)
[1] -1.6000000  0.1089594
> # Test Stat, z= -1.60   p value=0.1090   pvalue > alpha (0.10) Fail to Reject Ho.
> # Conclusions: There is not sufficient evidence to warrant rejection of the claim
  that the actual percentage is 53%.
```

Question 8:

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> #8
> # Ho: p=0.50   H1: p > 0.5  alpha=0.01  x=108, n=202
> z.test.prop.pvalue(108, 202, 0.50, 1) # one tailed test (>)
[1] 0.9900000 0.1623031
> # Test stat z=0.99  p value=0.1623  pvalue > alpha (0.01) Fail to reject Ho
> # Conclusions: There is not sufficient evidence to support the claim that
more than half of all those using the drug experience
```

Question 9:

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> #9
> # 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, low
er.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 (20, 22, 1.5, 60, 2)
[1] -1.033000e+01  5.267119e-25
> options(scipen=100) # it disables scientific notation
> z.test.pvalue (20, 22, 1.5, 60, 2)
[1] -10.330000000000000710542735760   0.000000000000000000000005267
> # Test Stat z=-10.33  p value = 0.0000  pvalue < alpha  Reject Ho
> # Conclusions: There is sufficient evidence to warrant rejection of the
claim that the population mean temperature is 22C
```

Question 10:

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> #10
> # 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)}
+ }
> # Ho: mu =35   H1: mu !=35   alpha = 0.01    xbar: 41  s=3.7  n=20
> t.test.pvalue(41, 35, 3.7, 20, 2)
[1] 7.2500000000 0.0000006974
> # Test Stat, t=7.25  pvalue = 0.00  < alpha   Reject Ho
> # Conclusions: There is sufficient evidence to warrant rejection of the claim
that the mean is equal to 35.0
```

Question 11:

```
> #10
> # Ho: mu =10, H1: mu < 10   alpha= 0.01   xbar: 7.3  s=1.5  n=18
>  t.test.pvalue(7.3, 10, 1.5, 18, 1)
[1] -7.6400000000000  0.0000003415685
> # test Stat  t= -7.65   p value = 0.00 < alpha  Reject Ho
> # Conclusions: There is sufficient evidence to support the claim that the mean
is less than 10 minutes
```

Question 12:

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> #12
> x<-c(518,548,561,523,536,499,538,557,528,563)
> #Ho: mu=520, mu > 520, alpha = 0.05
> t.test(x,mu = 520, alternative = "greater")

        One Sample t-test

data:  x
t = 2.6122, df = 9, p-value = 0.01409
alternative hypothesis: true mean is greater than 520
95 percent confidence interval:
 525.0998      Inf
sample estimates:
mean of x
    537.1
> # Conclusions: There is sufficient evidence to support the claim that the
mean is greater than 520 hours
```

Question 13:

```
> #13
> # Ho mu1 = mu2     H1 mu1 > mu2   alpha =0.025
> require(BSDA)
> #tsum.test(mean1,s1,n1,mean2,s2,n2,alt="**",conf.level=.95)

> tsum.test(73.2,10.9,16,68.9,8.2,12, alt="greater")

        Welch Modified Two-Sample t-Test

data:  Summarized x and y
t = 1.1913, df = 25.995, p-value = 0.1222
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -1.856584        NA
sample estimates:
mean of x mean of y
     73.2      68.9


> # Test stat  t=1.19   p-value = 0.1222  > alpha.    Fail to Reject Ho.
> # Conclusions: There is not sufficient evidence to support the claim that
  the mean resting  pulse rate of people who do not exercise regularly
  is larger than the mean   resting pulse rate of people who exercise regularly.
```

Question 14:

```
> #14
> # Ho: mu1 = mu2   H1: mu1 != mu2  alpha = 0.02        n1 = n2 = 50
> tsum.test(7.6,1.4,50,6.9,1.7,50, alternative = "two.sided")

        Welch Modified Two-Sample t-Test

data:  Summarized x and y
t = 2.2476, df = 94.524, p-value = 0.02693
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.08165696 1.31834304
sample estimates:
mean of x mean of y
      7.6       6.9

> # test Stat   t=2.25  pvalue = 0.0269 > alpha (0.02)    Fail to Reject Ho
> #Conclusions: At the 2% significance level, there is not sufficient evidence
  to warrant rejection of the claim that the mean response time for company A
  is the same as the mean response time for company B.
```