Exam3\_Key.R

## Q Exam3 MT3  
## 1 E  
## 2 D  
## 3 B  
## 4 A  
## 5 A  
## 6 E  
## 7 A  
## 8 C  
## 9 D  
## 10 A  
## 11 C  
## 12 E  
  
## Q13 - Hypothesis testing and confidence regions, H testing  
## determine evidence against a hypothesis about a single  
## value of the parameter. C regions attempt to find a  
## range in which the value of the parameter can be found.  
  
## Q14 - increase n, increase alpha ... increase n is better  
## because it does not raise probability of type I error.  
  
## Q15 - increase n, reduce confidence (increase alpha).  
## increase n is better b/c don't increase error rate.  
  
## Q16 - statistical significance is mathematically disproving  
## the Ho (finding a mathematical difference). Practical  
## significance is determining whether a difference really  
## matters (in real-life is that a pertinent difference).  
  
## Q17 - similar ... ~bell, centered on zero  
## differ ... t is wider and flatter (more probability  
## in the tails), depends on df  
  
## Question 18a  
# Pr(xbar=200 or greater, assuming mu=190)  
( distrib(200,mean=190,sd=20/sqrt(40),lower.tail=FALSE,plot=FALSE) )

## [1] 8e-04

# p-value (0.0008) < alpha (0.01), reject Ho  
  
## Question 18b  
( zstar <- distrib(0.99,type="q",lower.tail=FALSE,plot=FALSE) )

## [1] -2.326

200+zstar\*20/sqrt(40)

## [1] 192.6

# I am 99% confident that mu is greater than 192.6  
  
## Question 19  
( zstar <- distrib(0.05,type="q",plot=FALSE) )

## [1] -1.645

( n <- (zstar\*40/5)^2 )

## [1] 173.2

# Thus, sample 174 biologists  
  
## Question 20  
d <- read.table("Strawberries.txt",header=TRUE)  
  
# 1. alpha = 0.10  
# 2. Ho: mu=12 vs Ha: mu<12, where mu=mean number of berries  
# on all plants in my garden the year after planting  
# 3. 1-sample Z-test because (i) one population (my garden),  
# (ii) quantitative variable (number of berries), and (iii)  
# sigma is known (=5)  
# 4. Observational study with randomly selected plants.  
# 5. (i) sigma is known (=5) and (ii) n=50>30.  
z.test(d$berries,mu=12,alt="less",sd=5,conf.level=0.9)

## One Sample z-test with d$berries   
## z = -2.546, n = 50.000, Std. Dev. = 5.000, SE of the sample mean =  
## 0.707, p-value = 0.005455  
## alternative hypothesis: true mean is less than 12   
## 90 percent confidence interval:  
## -Inf 11.11   
## sample estimates:  
## mean of d$berries   
## 10.2

# 6. xbar=10.2 berries (Table 1)  
# 7. Z=-2.546 (Table 1)  
# 8. p-value=0.0055  
# 9. Reject Ho because p-value < alpha  
# 10. It appears that the mean number of berries per plant in ALL plants  
# in my garden is less than the 12 that the company claimed.  
# 11. I am 90% confident that the mean number of berries [produced]  
# by ALL plants in my garden is less than 11.1 (Table 1).