Math 152 - Statistical Theory - not Homework

write your name here

Not Due

Book problems:

8.5 – 6 (no CLT), 7
8.6 – 5, 8, 9 [(b) is a CI, not a PI]

R problem (Bootstrapping)

How well do frequentist confidence intervals actually capture the parameter of interest? What happens when we forget to use a t-multiplier and use a standard normal multiplier instead? First, let's see what happens when we correctly use the t-multiplier. Remember, we're talking about sampling distributions which means we'll have to take LOTS OF SAMPLES and look at many different confidence intervals.

```
n.samps = 10  # you will get more info by taking more samples
n.obs = 10  # what happens if you increase the sample size?
mymean = numeric(n.samps)  # place holder
mysd = numeric(n.samps) # place holder
conf.level = .947
mu = 47
sigma = 4

for (i in 1:n.samps){
  mysample = rnorm(n.obs, mu, sigma)  #note, mean is mu, sd is sigma
  mymean[i] = mean(mysample)
  mysd[i] = sd(mysample)

  }

upper.CI = mymean - qt((1-conf.level)/2,n.obs-1) * mysd/sqrt(n.obs)
lower.CI = mymean + qt((1-conf.level)/2,n.obs-1) * mysd/sqrt(n.obs)

sum(upper.CI < mu)
```

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

```
sum(lower.CI > mu)
```

```
## [1] 0
```

1. Comment on the coverage rate of a standard t-interval for the population mean, μ. [Bigger n.samps will probably give you more information.]

2. Repeat #1. above but change **qt** to use the quantile (multiplier) for a normal distribution instead of a t distribution. What is the new coverage rate? Why does that make sense?

3. Repeat #1 and #2 for a sample of size 100 (n.obs=100). Also, report the actual multipliers (the output of qt and qnorm). How does sample size play a role in coverage rate?