QUIZ 7 Rubric

a) Write code to build the (empirical) sampling distribution of the 90th sample percentile (or 0.9 sample quantile) of the sample. Let the number of trials be 10,000, and the sample size be 100. For the population, use standard normal, i.e., use rnorm(), NOT sample(), to take samples.

Important: start your code with set.seed(1).

set.seed(1)

n.trial = 10000

sample.size = 100

sample.stat = numeric(n.trial)

for (trial in 1:n.trial) {

samp = rnorm(sample.size, 0, 1) # 1 point for rnorm (0.5 for sample())

sample.stat[trial] = quantile(samp, prob=0.9) # 1 point for quantile()

}

hist(sample.stat) # FYI, mean = 1.25, sd = 0.166

b) Write code to test the normality of the histogram in part a.

qqnorm(sample.stat) # Straight line implies normality. # 1 point

c) Write code to take 1000 samples of size 100 from Unif(0,2), and count/report the number of times the 95% CI for b covers b. Important, start your code with set.seed(1).

set.seed(1)

b = 2

n.trial = 1000

sample.size = 100

CI = matrix(nrow=n.trial, ncol=2)

for (i in 1:n.trial) {

x = runif(sample.size,0,b) # 1 point for using runif to take samples

lower = 2\*mean(x)/(1+qnorm(.975)/sqrt(3\*sample.size))

upper = 2\*mean(x)/(1-qnorm(.975)/sqrt(3\*sample.size))

CI[i,] = c(lower,upper)

# 1 point for getting the CIs (-0.5 for minor mistakes). It’s fine if one doesn’t use qnorm but instead use 1.96. No point if not using formula from the homework.

}

cnt = 0

for (i in 1:n.trial) {

if (CI[i,1] <= b & CI[i,2] > b) # unimportant where "=" is.

cnt = cnt+1

}

cnt # 948 . If all is good the count should be around 950.

# 1 point for getting the count (-0.5 if result not reported). No point if the true value of b is not compared with the CIs)

# Total 6 points