BIOS 7731 HW 7

Tim Vigers

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BD 5.3.13

c)

For each n (degrees of freedom), find the critical value. Plug the critical value and n into the two approximations from above and compare.

```
# Vector of n
n = c(5,10,25)
# Get critical values
q9 = qchisq(0.9,df=n)
q99 = qchisq(0.99,df=n)
# CLT approximations
clt9 = pnorm((q9-n)/sqrt(2*n))
clt99 = pnorm((q99-n)/sqrt(2*n))
# Part b
b9 = pnorm(sqrt(2*q9)-sqrt(2*n))
b99 = pnorm(sqrt(2*q99)-sqrt(2*n))
# Make tables
t9 = cbind(n,b9,clt9)
kable(t9,caption = "90th %ile",col.names = c("n","Part b)","CLT"),
      digits = 3)
```

Table 1: 90th %ile

n	Part b)	CLT
5	0.872	0.910
10	0.881	0.910
25	0.889	0.908

```
t99 = cbind(n,b99,clt99)
kable(t99,caption = "99th %ile",col.names = c("n","Part b)","CLT"),
      digits = 3)
```

Table 2: 99th %ile

n	Part b)	CLT
5	0.99	0.999
10	0.99	0.998
25	0.99	0.997

For the $x_{0.90}$ case, the approximation from part b) slightly underestimates the probability while the CLT approach slightly overestimates. Both seem to perform well, however, and get very close to the correct value as n increases. In the $x_{0.99}$ case, the approximation from part b) is correct for every value of n, while the CLT approximation is too large. The CLT approximation again improves as n increases, but I think the approximation from part b) is better overall.