F2

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4.2.1

a.

```
pnorm(1.96, mean=0, sd=1) - pnorm(-1.96, mean=0, sd=1)
```

```
## [1] 0.9500042
```

b.

x = 1.96*sqrt((p(1-p))/n) + p

4.2.2

a. 4

b. phat = 0.2 SEp = 0.056

c. 0.10976 95% lies between 0.09 and 0.31 0.23 lies in that interval

d.

```
steak_survey=sample(c("YES", "NO"), 50, replace = TRUE, prob = c(0.23, 0.77))
print(length(which(steak_survey=="YES")))
```

```
## [1] 19
```

e. phat = 0.24 SEp = 0.06 C95% = 0.118, (0.13, 0.35) Yes it includes 0.23

f. This confidence interval

g.

```
numsamp=100
n=50
p=0.23

samp_phat = rep(NA, numsamp)
samp_SE = rep(NA, numsamp)
color_vec=rep(NA, numsamp)
```
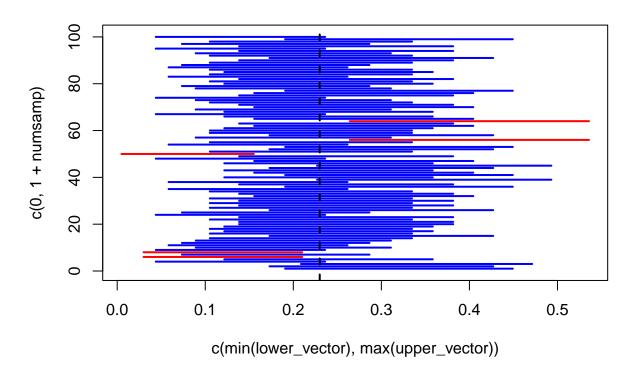
```
for(i in 1:numsamp){
  samp = rbinom(1,n,p) # obtain a sample of size n  from the population
  samp_phat[i] = samp/n    # Find the proportion for this sample
  samp_SE[i] = sqrt(samp_phat[i]*(1-samp_phat[i])/n)  # Find the standard error
}
lower_vector = samp_phat - 1.96 * samp_SE
upper_vector = samp_phat + 1.96 * samp_SE

for (j in 1:numsamp){
  color_vec[j]="red"
  if(p>=lower_vector[j] & upper_vector[j]>=p){color_vec[j]="blue"}
}
plot(c(min(lower_vector),max(upper_vector)), c(0, 1 + numsamp), type = "n")
for (i in 1:numsamp) lines( c(lower_vector[i], upper_vector[i]),c(i, i), lwd = 2, col=color_vec[i], add=
```

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```

```r
abline(v = p, lwd = 2, lty = 2)
```


Only a few, which makes sense.

4.2.3

   a. Wider
   b. Narrower

4.2.4 SKIP

4.2.5

```r
military = read.csv("https://github.com/TienChih/tbil-stats/raw/main/data/military.csv")
names(military)
```

```
## [1] "grade"  "branch" "gender" "race"   "hisp"   "rank"
```

   a.

```
n=50
index = sample(1:nrow(military), n)
samp=military[index,]
```

b.

```
length(which(samp$branch=="army"))
```

```
## [1] 15
```

phat $= 19/50 = 0.38$

c. SEp $= 0.0686$ C95% $= 0.13 = (0.25, 0.51)$
d.
e.

```
length(which(military$branch=="army"))/nrow(military)
```

```
## [1] 0.3929392
```

This is within the confidence interval