HW3_Stats

Tianchu Ye (Section 2)

November 17, 2017

4.15

Given: $E = .03$, $c = 2.576$

$$n = \frac{c^2}{4 \times E^2} = \frac{2.576^2}{4 \times .0009} \approx 1843$$

```
qnorm(.995)
```

```
## [1] 2.575829
```

```
qnorm(.995)^2/(4*.03^2)
```

```
## [1] 1843.027
```

4.17

Given: $n_1 = 100, n_2 = 80$; $\bar{x}_1 = \$41.25, s_1 = \$24.25$; $\bar{x}_2 = \$45.75, s_2 = \$34.76$.
(a) For 95%, $c = 1.96$. Then we have
$CI_{\mu_1} = \bar{x}_1 \pm c \times \frac{s_1}{\sqrt{n_1}} \approx \$41.25 \pm \$4.75 = [\$36.5, \$46.0]$,
$CI_{\mu_2} = \bar{x}_2 \pm c \times \frac{s_2}{\sqrt{n_2}} \approx \$45.75 \pm \$7.62 = [\$38.13, \$53.37]$.
(b) $CI_{\bar{x}_1 - \bar{x}_2} = (\bar{x}_2 - \bar{x}_1) \pm c \times \sqrt{s_1^2/n_1 + s_2^2/n_2} \approx -\$4.5 \pm \$8.98 = [-\$13.48, \$4.48]$

```
qnorm(.975)
```

```
## [1] 1.959964
```

```
1.96*24.25/sqrt(100)
```

```
## [1] 4.753
```

```
1.96*34.76/sqrt(80)
```

```
## [1] 7.617121
```

```
1.96*sqrt(24.25^2/100+34.76^2/80)
```

```
## [1] 8.978393
```

4.18

(a) *Given:* $n = 20$(small), $\bar{x} = 8.1, s = 3.9, c = 2.86$
$CI_\mu = \bar{x} \pm c \times \frac{s}{\sqrt{n-1}} = 8.1 \pm 2.5 = [5.6, 10.6]$ unoccupied seats per flight.

(b) *Given:* $n = 80, \bar{x} = 15.5min, s = 6.7min, c = 1.96$
$CI_\mu = \bar{x} \pm c \times \frac{s}{\sqrt{n}} = 15.5min \pm 1.5min = [14.0min, 17.0min]$

(c) *Given:* $E = 1,\ c = 2.576$

$$n = \frac{c^2 \cdot s^2}{1^2} \approx 298$$

(d) *Given:* $\hat{p} = 60/80 = .75, \hat{q} = 1 - \hat{p} = .25, c = 1.96$

$$CI_p = \hat{p} \pm c \times \sqrt{\frac{\hat{p}\hat{q}}{n}} = .75 \pm .098 = [0.652, 0.848]$$

(e) *Given:* $E = .02, c = 1.96$

$$n = \frac{c^2}{4 \times E^2} = 2401$$

```
qt(.995,df = 20-1)
```

```
## [1] 2.860935
```

```
2.86*3.9/sqrt(20)
```

```
## [1] 2.49411
```

```
qnorm(.995)
```

```
## [1] 2.575829
```

```
2.575^2*6.7^2/1
```

```
## [1] 297.6488
```

```
qnorm(.975)
```

```
## [1] 1.959964
```