Section_4.2.R

phanthihonghuong

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```r
# 4.2-1  (a)
x = c(13.1,5.1,18.0,8.7,16.5,9.8,6.8,12.0,17.8,25.4,19.2,15.8,23.0)
sd(x)
```

```
## [1] 6.144165
```

```r
# 4.2-1 (b)
lower = sd(x)*sqrt(12/qchisq(0.975, 12, ncp = 0, lower.tail = TRUE, log.p = FALSE))
lower
```

```
## [1] 4.405895
```

```r
upper = sd(x)*sqrt(12/qchisq(0.025, 12, ncp = 0, lower.tail = TRUE, log.p = FALSE))
upper
```

```
## [1] 10.14239
```

```r
# 4.2-5 (a)
x = c(15,23,12,18,9,28,11,10)
y = c(25,20,35,15,40,16,10,22,18,32)
var(x)/var(y)
```

```
## [1] 0.4986555
```

```r
# 4.2-5 (b)
(var(x)/var(y))*qf(0.95, 9, 7, log = FALSE)
```

```
## [1] 1.833394
```

```r
# 4.2-7
x = c(21.50,18.95,18.55,19.40,19.15,22.35,22.90,22.20,23.10)
mean(x)
```

```
## [1] 20.9
```

```r
qt(0.975, 8, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/9)
```

```
## [1] 1.428513
```

```r
lower = mean(x) - qt(0.975, 8, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/9)
lower
```

```
## [1] 19.47149
```

```r
upper = mean(x) + qt(0.975, 8, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/9)
upper
```

```
## [1] 22.32851
```

```r
# 4.2-9 (a)
x = c(3.1,3.3,4.5,2.8,3.5,3.5,3.7,4.2,3.9,3.3)
mean(x)
```

```
## [1] 3.58
```

```r
# 4.2-9 (b)
sd(x)
```

```
## [1] 0.5116422
```

```r
# 4.2-9 (c)
qt(0.95, 9, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/10)
```

```
## [1] 0.2965894
```

```r
lower = mean(x) - qt(0.95, 9, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/10)
lower
```

```
## [1] 3.283411
```

```r
# 4.2-11 (a)
x = c(28.8,24.4,30.1,25.6,26.4,23.9,22.1,22.5,27.6,28.1,
      20.8,27.7,24.4,25.1,24.6,26.3,28.2,22.2,26.3,24.4)
mean(x)
```

```
## [1] 25.475
```

```r
sd(x)
```

```
## [1] 2.493544
```

```r
# 4.2-11 (b)
qt(0.99, 19, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/20)
```

```
## [1] 1.415948
```

```r
mean(x) - qt(0.99, 19, lower.tail = TRUE, log.p = FALSE)*sqrt(var(x)/20)
```

```
## [1] 24.05905
```

```r
# 4.2-13 (a)
x = c(649,657,714,877,975,468,567,849,721,791,874,405)
y = c(699,891,632,815,589,764,524,727,597,868,652,978,479,733,549,790)
Sp = sqrt((11*var(x)+15*var(y))/(12+16-2))
mean = mean(x)-mean(y)
mean
```

```
## [1] 6.8125
```

```r
qt(0.975, 12+16-2, lower.tail = TRUE, log.p = FALSE)*Sp*sqrt((1/12)+(1/16))
```

```
## [1] 122.2645
```

```r
lower = mean - qt(0.975, 12+16-2, lower.tail = TRUE, log.p = FALSE)*Sp*sqrt((1/12)+(1/16))
lower
```

```
## [1] -115.452
```

```r
upper = mean + qt(0.975, 12+16-2, lower.tail = TRUE, log.p = FALSE)*Sp*sqrt((1/12)+(1/16))
upper
```

```
## [1] 129.077
```

```r
# 4.2-13 (b)
quantile(x, probs = c(0,0.25,0.50,0.75,1))
```

```
##      0%     25%     50%     75%    100%
## 405.00 628.50 717.50 855.25 975.00
```

```r
quantile(y, probs = c(0,0.25,0.50,0.75,1))
```

```
##      0%     25%     50%     75%    100%
## 479.00 595.00 713.00 796.25 978.00
```

```r
# 4.2-13 (c)
var(x)/var(y)
```

```
## [1] 1.491766
```

```r
qf(0.975, 11, 15, log = FALSE)
```

```
## [1] 3.007828
```

```r
# 4.2-17
z = qnorm(0.95, mean = 0, sd = 1, lower.tail = TRUE, log.p = FALSE)
z
```

```
## [1] 1.644854
```

```r
(z*5*sqrt(2))**2
```

```
## [1] 135.2772
```