Problem #4

(4a) The 2 sampled t test is the one that should be used because it's possible that the variances of Auditory reaction time are different than the variance of visual reaction time.

b) $H_0: \mu_V = \mu_A$

$H_a: \mu_V < \mu_A$

$\bar{X}_V = 194$ $\quad S_V = 25.53$

$\bar{X}_a = 192.3$ $\quad S_a = 29.106$

$$t = \frac{\bar{X}_V - \bar{X}_a - (\mu_V - \mu_a)}{\sqrt{\frac{S_V^2}{n} + \frac{S_a^2}{n}}} = \frac{194 - 192.3 - 0}{\sqrt{\frac{25.53^2}{6} + \frac{29.106^2}{6}}}$$

$= 0.105$

$$V = \frac{(S_{eV}^2 - S_{ea}^2)^2}{\frac{S_{eV}^2}{n-1} + \frac{S_{ea}^2}{n-1}} \quad \text{where} \quad S_{eV} = \frac{S_V}{\sqrt{n}} \quad S_{ea} = \frac{S_a}{\sqrt{n}} = 21.15$$

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Pvd: $P(T < t) = 0.46 > \alpha = 0.05$

the p value > 0.05, so we should not reject the null hypothesis.

Prob 4 Calculations

```
xv <- c(161, 203, 235, 176, 201, 188)
m <- length(xv)

xa <- c(157, 207, 198, 161, 234, 197)
n <- length(xa)

xv_bar <- mean(xv)
xa_bar <- mean(xa)

sv <- sqrt(var(xv))
sa <- sqrt(var(xa))

t <- (xv_bar - xa_bar) / sqrt(sv^2/m + sa^2/n)

sev <- sv/sqrt(m)
sea <- sa/sqrt(n)
v <- (sev^2 - sea^2)^2/(sev^2/(m-1) + sea^2/(n-1))

p <- pt(t, v, lower.tail=FALSE)
```