Example 14
Determining Sample Size

1. We want to test for a difference between the mean blood-clotting time of persons using two different drugs.
2. Significance level of 0.05
3. 90% chance of detecting a true difference between population means as small as 0.5 min.
4. Pooled variance based on previous studies is estimated to be 0.52 min^2.
5. We guess that a sample size of 100 will be required ν=(n-1)+(n-1)=198. (first iteration)
6. $t_{0.05(2),\,198} = 1.98$
7. $\beta=1-0.90=0.10$, $t_{0.10(1),198}=1.289$

$$n \geq \frac{2s_p^2}{\delta^2}(t_{\alpha,\nu} + t_{\beta(1),\nu})^2$$

$$n \geq \frac{2(0.52)}{(0.5)^2}(1.98 + 1.289)^2 = 44.45$$

8. Now we guess that a sample size of 45 will be required ν=(n-1)+(n-1)=88 (second iteration)
9. $t_{0.05(2),\,88} = 2.00$
10. $\beta=1-0.90=0.10$, $t_{0.10(1),88}=1.296$

$$n \geq \frac{2(0.52)}{(0.5)^2}(2.00 + 1.296)^2 = 45.19$$

11. Now we guess that a sample size of 46 will be required ν=(n-1)+(n-1)=90 (third iteration)
12. $t_{0.05(2),\,90} = 2.00$
13. $\beta=1-0.90=0.10$, $t_{0.10(1),90}=1.296$

$$n \geq \frac{2(0.52)}{(0.5)^2}(2.00+1.296)^2 = 45.19$$

14. Therefore we conclude that we need two samples of at least 46.

Example part 2
If one of the samples is limited (constrained) to be a certain number use the equation:

$$n_2 = \frac{n_1 * n}{2n_1 - n}$$

If we assume that the one sample size is constrained to 40 data then:

$$n_2 = \frac{40 * 45.19}{2(40) - 45.19} = 51.93$$

and we conclude that we needed a minimum 52 data in the second sample.