SAMPLE SIZES BASED ON CONFIDENCE INTERVALS

Recall the soap experiment:
- Three soaps tested for solubility.
- A 1" cube of each was weighed, soaked in water, dried, and weighed again. The difference in weights is the response.
- A pilot experiment gave estimate 0.007 g for σ.
- The experimenter wants to be able to detect a weight loss of 0.25 g.

We previously estimated sample size based on power.

Now we want to estimate sample size based on joint 95% Bonferroni confidence intervals.

So we want
$$msd \leq 0.25$$

Comparing three means gives three differences we need to estimate. If we use equal sample sizes r for each treatment, then
$$msd = w_B \sqrt{msE\left(\frac{1}{r} + \frac{1}{r}\right)},$$
and
$$w_B = t(n-v, 1 - .05/(6)$$

$$= t(3(r-1), .9917)$$

Estimating msE by .007, we then want

$$w_B^2 (.007)(2/r) \leq (0.25)^2 = 0.0625$$
or

$$w_B^2 \leq (0.0625/0.014)r = 4.464r$$

Use trial and error, starting with r = 5 (from our
power calculation):

r	3(r-1)	$w_B =$ t(3(r-1), .9917)	$t^2 = w_B^2$	4.464r	action
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