NRES 746, Week 13, Lecture 1: Partial Pooling by Hand

Name: _____

Instructions: Work alone (about 5 minutes), then compare with a neighbor. Keep laptops closed.

You swab frogs for the chytrid fungus Bd in many ponds and record each frog's infection load ($\log_{10}$ zoospore equivalents). A random intercept model fit to all the ponds gives an overall mean load $\hat{\mu} = 3.0$, an among-pond SD $\sigma_b = 0.5$, and a within-pond (frog-to-frog) SD $\sigma = 1.0$. The model's estimate for pond j is

$$\hat{a}_j = \hat{\mu} + w_j(\bar{y}_j - \hat{\mu}), \qquad w_j = \frac{\sigma_b^2}{\sigma_b^2 + \sigma^2/n_j}$$

where $\bar{y}_j$ is the mean load of the n_j frogs swabbed in that pond.

Pond	Frogs swabbed (n_j)	Mean load ($\bar{y}_j$)
A	4	4.2
B	16	4.0

1a. $w_A =$ _____ $w_B =$ _____

1b. $\hat{a}_A =$ _____ $\hat{a}_B =$ _____

1c. Which pond would you report as more heavily infected? Explain why the model's ranking differs from the ranking of the raw means.