

**Participant Quiz**  
**Module 2: Two-level Model for NMMAPS Data**

1. In a two-stage model, the major sources of variation in an estimate of a regression parameter (e.g. log relative risk) are (check all that apply):
  - (a). statistical error the arises from imprecision in the finite set of measurements
  - (b). Bayesian error
  - (c). conjugate distribution error
  - (d). natural variation in the true parameter values
  - (e). stochastic correspondence deviations
  
2. In estimating the average parameter value (here, log relative risk) across cities, we should weight the city-specific estimates: (choose best answer):
  - (a). inversely proportional to the standard error
  - (b). proportional to the standard error
  - (c). inversely proportional to the statistical variance
  - (d). proportional to the statistical variance
  - (e). inversely proportional to the sum of the statistical and natural variance
  
3. When the statistical variance is small relative to the natural variance, we estimate each city's parameter value by: (choose best answers):
  - (a). the un-weighted average of all the city-specific estimates
  - (b). that city's maximum likelihood estimate
  - (c). the weighted average of all the city-specific estimates
  - (d). a linear combination of the city-specific mle and the overall un-weighted average
  - (e). a linear combination of the city-specific mle and the overall weighted average
  
4. As the natural variance increases, the standard error of the overall estimate (choose all correct answers):
  - (a). decreases
  - (b). stays the same
  - (c). increases
  - (d). decreases roughly proportional to the estimate so that the t-statistic is unchanged
  - (e). increases roughly proportional to the estimate so that the t-statistic is unchanged
  
5. Relative to the mle, the empirical Bayes estimate for a city's parameter (e.g. log relative risk) is: (check all correct answers)
  - (a). is shrunk toward the overall estimate
  - (b). is more biased
  - (c). is more precise
  - (d). is less biased
  - (e). is less precise



