Don's list of Declare Design Topics (<mark>May 13, 2024</mark>):

1. Covariate selection
   a. Assess the bias and MSE from the following selection rules:
      i. Significant predictors of Y using only the control group
      ii. Significant predictors of Y using all subjects (but without a treatment indicator in the regression)
      iii. LASSO using all subjects but without a treatment indicator
      iv. Significant predictors of treatment ("balance test" with varying significance thresholds)
      v. Select only covariates that are significant predictors of treatment AND significant predictors of Y using only the control group
      vi. Significant predictors of treatment AND Significant predictors for all N
      vii. Significant predictors of treatment and LASSO on all N
   b. Matched pairs
      i. How accurate are conventional standard errors? Is it necessary to cluster the SEs by pair?
      ii. Even in a cluster randomized trial – still cluster by pair rather than cluster?
      iii. Can/should covariate selection algorithms be used to choose which pair dummies to include? How do selection algorithms compare to include-all-dummies adjustment in terms of approximating the true standard error?
   c. Assess ex ante vs. ex post bias
      i. Balance test and adjust (a response to Mutz et al.)
      ii. Balance test and adjust IF covariate is a significant predictor of Y among the control group
      iii. Balance test and adjust IF covariate is a significant predictor of Y for all N
      iv. What happens if we use a higher or lower p-value threshold?
   d. Decorrelation methods
      i. How do they perform as N and K vary? Do they eliminate Freedman bias? Is RI still feasible?
      ii. How does decorrelation compare to LOOP (Gu et al.)?
2. Mediation
   a. Show how the causal mediation analysis approach based on sequential ignorability can fail
   b. Show how the sensitivity analysis approach of Imai et al. can fail (in other words, the sensitivity test they propose is itself sensitive to assumptions)
   c. Show how the no interactions assumption of Acharya et al. 2016 can fail
   d. Simulate the implicit mediation approach of Bullock and Green, and show that it depends on having instruments that differentially predict the mediators; otherwise, one is left with a weak instruments problem and attendant biases