Week 1

- Broad goal: Fix code.
  - ☑ Use less filtered dataset
    - Now at 30% with 39 taxa.
  - ☑ Make graphs of parameter values at each iteration
    - Did a lot of graphs, histograms and changes of betas between loops. Need to do final after changes are made.
  - ☑ Try stepwise update
    - Using .1 as a constant. Still doesnt work, so likely a more complicated approach would not be helpful.
  - ☑ Fix problem where R inverse and others not updating in beta loop
  - ☑ Change R-inv function to depend on alpha instead of X and beta since already calculated.
  - ☑ Flip order of beta and phi loops.
  - ☑ Look at residuals in each iteration. (in phi step)
  - ☐ Keep something constant through loop and/or try using identity for R.
  - ☑ Try different dataset? Maybe simulated one from previous paper.
    - Same troubles
  - ☐ Distance matrix argument to dist?
    - Need both forms, so may or may not be useful
  - ☐ Check if phi is correct now, and see how is used
  - ☑ Figure out large alpha problem
    - Seems the + and one loop beta fixed this?
  - ☐ Try a different covariate?
  - ☐ Figure out why geem code uses + instead of - on update
    - I think + is correct. At least it converges.
  - ☐ Identify which covariate is causing the trouble.
  - ☐ Try removing the single OTU that seems to be contributing to problem.
  - ☐ Save everything to list correctly to look at later.
    - Saving rho, omega, phi, beta, diff (abs), num iterations
    - Also do residuals. Which residuals? Cross product ones? Squared ones? Standardized squared ones? Probably standardized but not squared. Should be distributed around zero. ?
  - ☑ Plot lists
    - Plotted rhos, omegas, phis, diffs, not sure what else to plot.
  - ☑ Remove scalar update.
    - Doesn't work. see journal
  - ☐ Write up algorithm for Yuan to go through? Ask to check.
  - ☐ Final run through before meeting of graphs and numbers
  - ☑ Move timing into function

Week 2

Main tasks:

- To-do from sheet
- Prepare presentation

☑ Wednesday email research update.

☐ Include more taxa: more zero-inflation

☐ Try different covariates (parasite burden/antibiotics/exposure)

☐ Think about genus level analysis/ phylogenetic tree for taxonomic units

☐ Choose α automatically (simple line search)

☐ Make presentation

☐ Wednesday email research update.

☐ Calculate sandwhich variance estimators for asymptotic significance tests.

☐ Make sure subtraction in ϕ is correct

☐ Understand how Hessian is calculated and expected values equal zero.

☐ Run on previous dataset from original paper.

☐ Rename file with algorithm

☐ Compare to independence GEE written already geeglm?

☐ Figure out why adding the minus sign changes the code.

☐ Write up line-search steps and goals