INSTRUCTIONS FOR RUNNING A WinBUGS PROGRAM

This assumes you have already downloaded WinBUGS 1.4, the update, and the key.

(Suppose your WinBUGS code is written and saved in a separate text file. For example, you could save the code for the "monkey eyes" analysis from class into a text file.)

1. Open WinBUGS. A console with several menu choices (File, Tools, Edit, etc.) should pop up.

2. Click: `File -> Open` in the WinBUGS menus. Navigate to your text file containing the WinBUGS code and select and open it. A window with the code should pop up within WinBUGS.

(We first check that the model is properly specified.)

3. Click: `Model -> Specification` in the WinBUGS menus. A window labeled `Specification Tool` should pop up.

4. Then click within the window containing the WinBUGS code and highlight the word "model". Click the "check model" button in the `Specification Tool` window. A message saying "model is syntactically correct" should appear in the bottom left of the WinBUGS program window.

(We then must load the data.)

5. Click within the window containing the WinBUGS code and highlight the word "list" at the beginning of the data part of the code. Click the "load data" button in the `Specification Tool` window. A message saying "data loaded" should appear in the bottom left of the WinBUGS program window.

(We now select the number of chains to run, that is, the number of samples to simulate. The default is to generate one sample, but generating multiple chains can be a useful way to check MCMC convergence.)

6. Type the number 2 (or however many chains you want) in the white box labeled "num of chains" in the Specification Tool window.

7. Click the "compile" button in the `Specification Tool` window. A message saying "model compiled" should appear in the bottom left of the WinBUGS program window.

(We now specify the initial values for the parameter estimates.)

8. Click within the window containing the WinBUGS code and highlight the word "list" at the beginning of the initial-values part of the code. Click the "load inits" button in the `Specification Tool` window. Click the "load inits" button similarly for the Chain 2 and any other chains, where applicable.

9. If initial values for all parameters are specified, a message saying "model initialized" should appear in the bottom left of the WinBUGS program window. If not, a message saying "model contains uninitialized nodes" should appear in the bottom left of the WinBUGS program window.

10. You do not have to specify initial values for every parameter. You can automatically generate initial values by clicking the "gen inits" button in the Specification Tool window. After doing this (if desired), a message saying "model initialized" should appear in the bottom left of the WinBUGS program window.

(WinBUGS generates initial values by sampling from the prior for that parameter, so be careful about this when the prior is especially diffuse (vague): the initial values it generates can be far from the best choices.)

11. Close the `Specification Tool` window.

(We now set up monitors to store the sampled parameter values.)

12. For moderate-sized simulations, we can store every sampled value. Click: `Inference -> Samples` in the WinBUGS menus. A window labeled "`Sample Monitor Tool`" should pop up. (i) Type (or choose) the name of the parameter to be monitored in the white box labeled "node". (ii) Click "set" in the `Sample Monitor Tool` window. Repeat (i) and (ii) for each parameter to be monitored.

12a. For large simulations with many parameters or many thousands of draws, it may be better to simply request a "Summary monitor". Click: `Inference -> Summary` in the WinBUGS menus. A window labeled "`Summary Monitor Tool`" should pop up. (i) Type (or choose) the name of the parameter to be monitored in the white box labeled "node". Repeat (i) for each parameter to be monitored. (Note that the "Summary monitor" cannot discard "burn-in" draws once it is set.)

(We now run the simulation.)

13. Click: `Model -> Update` in the WinBUGS menus. A window labeled "`Update Tool`" should pop up. Type the number of iterations (sampled parameter sets) you desire in the white box labeled "updates".

14. Click the "update" button to begin drawing samples. When it is done, a message saying "updates took XX seconds" should appear in the bottom left of the WinBUGS program window.

(We now check convergence for the parameter estimates.)

15. Click: `Inference -> Samples` in the WinBUGS menus. A window labeled "`Sample Monitor Tool`" should pop up. (i) Type (or choose) the name of the parameter to be monitored in the white box labeled "node". (ii) Click "history" in the `Sample Monitor Tool` window. A graphics window with a trace plot should appear. Repeat (i) and (ii) for each parameter to be monitored. (If multiple chains are running, the trace plot for each chain will appear in a different color.)

15a. To obtain "live" trace plots (while updating), do step 15 before step 13 (except clicking "trace" rather than "history" in the `Sample Monitor Tool` window). Then graphics windows will appear and will be filled in live with the trace plots as the samples are being drawn.

(You can run more iterations once you see that convergence has probably been reached.)

16. Again click: `Model -> Update` in the WinBUGS menus. A window labeled "`Update Tool`" should pop up. Type the number of iterations (sampled parameter sets) you desire in the white box labeled "updates". Click the "update" button to begin drawing further samples.

(We now obtain a summary of the posterior distribution.)

17. Click: `Inference -> Samples` in the WinBUGS menus. A window labeled "`Sample Monitor Tool`" should pop up. (i) Type (or choose) the name of the parameter to be selected in the white box labeled "node", or type * (star) to select all monitored parameters.

18. Type the name of the sample value to begin the posterior summary within the white box labeled "beg"; for example, typing 1001 will discard the first 1000 values as "burn-in".

19. Click the "stats" button and a table showing summary statistics for posterior(s) of the selected parameter(s) will appear. Click the "density" button and a window with a posterior density estimate for the selected parameter(s) will appear.