# *PSYC 4390/5090: Bayesian Statistics*

Tarleton State University — Homework 3

1. In an experiment on ESP (extrasensory perception), participants are required to predict the color (red or black) of a card drawn randomly from a complete deck. Suppose that a set of participants correctly identifies the color on 38 out of 64 trials.

   (a) In JASP, perform a Bayesian binomial test of the claim that participants are exhibiting ESP. Report and interpret the resulting Bayes factor. Be sure to write the mathematical form of the null and alternative hypothesis.

   (b) Construct the "Prior and Posterior" plot in JASP and explain in your own words what it tells us.

   (c) Assume that before observing these data, you assume that $\mathcal{H}_0$ and $\mathcal{H}_1$ are equally likely. Compute the posterior probability for the winning model.

2. A researcher would like to assess the effect of a behavior therapy program on reducing smoking behaviors. Following therapy, 48 people showed a decrease in smoking, and 16 showed an increase.

   (a) In JASP, perform a Bayesian binomial test of the claim that the therapy was effective for reducing smoking behaviors. Report and interpret the resulting Bayes factor. Be sure to write the mathematical form of the null and alternative hypothesis.

   (b) Construct the "Prior and Posterior" plot in JASP and explain in your own words what it tells us.

   (c) Assume that before observing these data, you don't believe that the proposed therapy program will be very effective, and as such, you place 3:1 odds *against* its efficacy. Based on these prior odds, compute the posterior probability for the winning model.