Statistics 956 Homework No. 5
Due Monday February 14.

Reading

- Read ZW pages 95–103 and 369–385 on vector autoregressive models.

- Review your class notes on Kelly-Breiman bet sizing, and review the methods for testing that $p = 1/2$ in a binomial model.

Comparison of two AR(2) Models vs. one Vector AR(1) Model

- Get 300 days of return data for two *closely related stocks* of your own choosing. Put this data into an appropriate S-Plus time series object. Using *just the first 200 days* of your data fit two univariate AR(2) models and a single bivariate AR(1) model. Evaluate these fits by the methods that are now familiar to you (e.g. practical and statistical significance of the coefficients, logical relationships of the coefficients, and examination of the residuals by qqnorm plots, and the WS, JB, and BL tests.)

- Now, see how well your fits let you predict the **signs** of next-day returns. Do this analysis for both the univariate model and the bivariate model on *both* the 200 day training sample and the 100 day test sample. Evaluate the quality of your predictions by an appropriate Z-test. Did you do significantly better (worse!) than you would have done by chance? Did you do "lots" worse on the test sample than on the training sample?

- Finally, combined your model-based guesses with Kelly-Breiman bet sizing to see if you can make money with these fits. Specifically, for both the univariate and the bivariate models, consider making a bet on each of the 2x100 test sample returns using Kelly-Breiman bet sizes based on your current fortune and your estimate p for correctly guessing the sign of tomorrow's return. For each model, find what $1,000,000 grow to (or fall to!) by the end of the 100 day test period.

How to Present Your Work

After you are sure that you have done your analysis correctly, you should write a one or two page Executive Report that summarizes what you have discovered. The report should contain all of the facts that you think are important, but it should omit details that do not add to the story. A good table or two can help keep your story within bounds.

Your report should also contain at least a few sentences that extrapolate your experience. For example, what parts of the study might have been done more sensibly? How might changes in the analysis have influenced the conclusions? In general, take a moment to show off your insight and understanding. Imagine the report is being read by a person who determines your bonus, your raise, etc.