

AGEC 622
10_mixed_marginals Exercises
Due before the beginning of the next class

- Complete the exercises in the notebook “10_exercises_LASTNAME_FIRSTNAME.xlsx”.
- **Rename your file, replacing ”LASTNAME_FIRSTNAME” with your actual names.**
- If there is more than one question, note that each should have its own tab in the workbook.
- **Work vertically down the sheet** within your notebook. Separate the individual parts of the question(s) (a, b, c, . . .) using dividing rows like the blue example dividers in the file.
- Submit this homework by emailing your xlsx file to henry@tamu.edu, **with the subject “AGEC 622 exercises 10”**.

1) **Question 1**

The overall objective of this question is to repeat the analysis from the 07, 08, and 09 exercises, but using the mixed marginal distribution with joint dependence for simulating the four underlying stochastic variables.

- a) **Build a model for the crop price.** Repeat step a) from the 07_exercises, but do not yet generate the stochastic residuals/errors/innovations or the forecasts. **Do** use the parameter estimation feature to fit parameters for parametric distributions. Below, you will assume that these residuals are drawn from a **uniform** distribution.
- b) **Build a model for the crop yield.** Repeat step b) from the 07_exercises, but do not yet generate the stochastic residuals/errors/innovations or the forecasts. Below, you will assume that these residuals are drawn from an **empirical** distribution.
- c) **Build a model the gasoline price.** Repeat step c) from the 07_exercises, but do not yet generate the stochastic residuals/errors/innovations or the forecasts. **Do** use the parameter estimation feature to fit parameters for parametric distributions. Below, you will assume that these residuals are drawn from a **normal** distribution.
- d) **Build a model for variable cost (VC).** Repeat step d) from the 07_exercises, but do not yet generate the stochastic residuals/errors/innovations or the forecasts. **Do** use the parameter estimation feature to fit parameters for parametric distributions. Below, you will assume that these residuals are drawn from a **beta** distribution.
- e) **Preparation for mixed marginals simulation.**
 - Generate u variables corresponding to all of the recovered historical residuals from parts a) through d) together in four columns, using the appropriate $F_i(y)$ for each. *Be sure these are aligned correctly, with all observations on a row corresponding to the same observation date.*
 - Generate four z variables corresponding to the four u variables.
 - Estimate a sample correlation matrix for the z variables.
- f) **Conduct mixed marginals simulation.**
 - Jointly generate dependent u draws.
 - Use the u draw, along with each residual series' respective $F_i^{-1}(u)$ to generate stochastic errors/residuals.
 - Use the stochastic errors to generate stochastic forecasts for the crop price, crop yield, gasoline price, and variable costs for 2019 through 2023.
- g) **Calculate financial variables for the enterprise.** Calculate NR and ending cash (beginning cash + NR) for each year for 2019 through 2023, following the approach and parameters for this

purpose from the 07_exercises.

h) **Simulate *NR* and ending cash.**

Determine the following values:

- Expected ending (2023) cash
- The probability ending (2023) cash is less than \$0
- The probability ending (2023) cash is less than \$100,000

i) **Interpret.**

- What differences in the results do you find?
- Do you have the most confidence in these results or those from the 07, 08, or 09 exercises?
- What problems, if any, do you see with the revised model/analysis?