**Fordham University**

**Gabelli School of Business**

**QFGB-8925: Simulation Applications**

ASSIGNMENT 5 (BONUS ASSIGNMENT): *Due, 1-Week*

(1) Credit Risk VaR

Calculate the 1% VaR level for a bond portfolio consisting of 100 bonds through Monte Carlo simulation. Simulation parameters are as follows:

1. Populate a portfolio of 100 Bonds using a uniform random number generator
2. Assume that the probability of default is determined through a multivariate normal process. If a normally distributed random number is below one standard deviation from a mean of zero, the bond is in default.
3. Simulate 100 random numbers from a multivariate normal distribution. Randomly populate a 100 x 100 matrix to represent the covariance matrix of the multivariate normal.
4. Using the covariance matrix generate 100 random numbers representing changes in the value of the asset in one day. Check if any of the random numbers is less than one standard deviation from zero to signal default.
5. Assume that the bond loses 20% of its value if there is default. Calculate the level of loss of the portfolio.
6. Repeat the steps above to generate a probability distribution for losses. Determine the level and percentage loss of losses at the 5% probability level.