**Fordham University**

**Gabelli School of Business**

**QFGB-8925: Simulation Applications**

ASSIGNMENT 4: *Due, 1-Week*

(1) Pricing American Options

Consider a $100 strike, 6-month American put option on a stock that Is currently trading at $100 and has a volatility of 25%. The stock pays no dividend and the risk free rate is 5%.

Calculate the price of the American put using Monte Carlo simulation. Simulation parameters are as follows:

1. Discretize using the log-normal approximation using a bi-weekly grid over 6 months.
2. Assume that the option is evaluated for early exercise once every two weeks.
3. Let the early exercise boundary be flat, i.e. the stopping time is specified in terms of a level of underlying stock price
4. Determine the level of the barrier that maximizes the value of the put option.
5. Determine the price of the American option using the optimally determined barrier.
6. Check the value of the American put against the value determined by a Binomial Model.
7. You are given the following term structure:

Maturity Yield

1 year 1.0%

2 year 2.0%

3 year 2.5%

4 year 3.0%

5 year 3.25%

Determine the value of a 5-year bond with a face value of 100 and a coupon rate of 6% per year. Calculate the price of a 1-year option to call the bond at face value. Calculate using simulations under the Ho-Lee and Vasicek framework. Make assumptions as needed, but please be clear and highlight the assumptions you make.