

# Simulation Methods for Option Pricing

## 46-932

### Homework #6

**Due: Tuesday, March 1, 2018, 5:30pm**

1. Practice on the Longstaff and Schwartz method

Refer to the paper by Longstaff and Schwartz. Implement their least squares methodology as described in the paper to replicate the Monte Carlo simulation entries in two rows of Table 1, p127 (you need not produce the finite difference results). In particular, for Table 1, replicate the two rows: (40,.20,1) and (40,.20,2).

2. Practice on GHS and Capriotti Importance Sampling

- a) Consider the standard Black Scholes problem with geometric Brownian for the underlying and parameters:  $S_0 = 100, r = .05, \sigma = .20, T = 1$ , and  $K = 120, 140, 160$ . Implement the GHS methodology using  $n = 10,000$ , replicate the results in the table on page 66 of the Course Notes. Your values for  $\hat{m}$  might differ somewhat from those in the table.
- b) Repeat the problem stated in part (a) except implement the Capriotti non-linear least squares method. Replicate the values given in columns 1, 4 and 5 of the top table on page 72 of the Course Notes. Again, your values for  $\hat{m}$  may differ slightly from those in the table.
- c) Repeat the situation in parts a) and b) except in this case use the Capriotti method allowing for changes of measure that involve both the mean and the variance of the underlying normal distribution. Replicate the results in the line 1, 4, 5 and 6 of the table at the bottom of page 72 in the Course Notes. Note that you might consider parameterizing the standard deviation of the normal distribution using  $\log(s)$  rather than  $s$  to avoid any concern that the standard deviation of the normal could become negative.