Problem set 4

Due date: Monday, October 24^{th}, 1:15 pm.

Exercise 1

Consider an option to exchange the return of AMZN (Amazon stock) with the return of the SPX (S&P 500) index. The payout is

$$\left(\frac{S_T^{SPX}}{S_0^{SPX}} - \frac{S_T^{AMZN}}{S_0^{AMZN}}\right)^+ \tag{1}$$

At the close of October 2^{nd}, 2018, a share of AMZN was worth \$1971, and the SPX index was at \$2921. The dividend rate of AMZN is 1.9% and that of the SPX index is 1.8%. Use $r = 2.4\%$, approximately equal to the 3-month LIBOR rate. The implied volatilities provided to you in the Excel spreadsheet correspond to the expiration of January 18, 2019. Time to expiration is $T = 0.296$ (108 days). Price this option by Monte Carlo simulation. Draw a sample of 10000 points using the Gaussian copula method (use correlation $\rho = 0.5$), mapping each marginal to the corresponding implied distribution. Also report the standard error of your simulation.