Module 3 Assignment

September 2017

This is a Computational Finance task on the use of the Monte Carlo scheme to price Asian options. It is also designed to encourage you to work through the notes - you should not be e-mailing us to enquire where in the material, relevant results are located! Full details are given in the Module 3 workshop. Queries to **riaz.ahmad@fitchlearning.com**

Task

Use the expected value of the discounted payoff under the risk-neutral density $\mathbb{Q}$

$$V(S,t) = \mathbb{E}^{\mathbb{Q}}\left[e^{-\int_t^T r_\tau d\tau}\textbf{Payoff}\left(S_T\right)\right]$$

for the appropriate form of payoff, to consider:

1. Arithmetic Sampling - fixed and floating strike
2. Geometric Sampling - fixed and floating strike

In both cases use the **Euler-Maruyama** scheme for simulating the underlying stock price using the following set of data

$$\begin{aligned} \text{Today's stock price } S_0 &= 100 \\ \text{Strike } E &= 100 \\ \text{Time to expiry } (T-t) &= 1 \text{ year} \\ \text{volatility } \sigma &= 20\% \\ \text{constant risk-free interest rate } r &= 5\% \end{aligned}$$

This is an open ended exercise and marking will be based on initiative shown and willingness to experiment, but your completed assignment should centre on a short report (and **computer code** separately) to include:

- Outline of the numerical procedure used
- Results - appropriate tables, comparisons and error graphs (e.g. changing number of simulations).
- Any interesting observations and problems encountered.
- Conclusion and references

Do not include code as an appendix to the report, this should be in a separate file.