FIN 5350- Homework 3

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## Numerical Problems

### **Problem 1**

* Start with the file pricers.py that I provided in class. Add to the module a function titled naive\_monte\_carlo\_pricer that implements the naive Monte Carlo method to price European calls and puts. Use the class VanillaOption to pass a first argument option to the pricer.
* Make sure the pricer function returns a namedtuple that contains the estimated price and the standard error. This might look something like this:
* See the jupyter notebook titled Namedtuple-Hints.ipynb for help with this.
* Price European call and put options where , , , , , using your new pricer function.
* Create a markdown table that presents the number of repititions, the estimated price and the standard error for where is the number of repitions in the Monte Carlo simulations.

### **Problem 2**

* Write another new pricer function titled antithetic\_monte\_carlo\_pricer that implements the antithetic variance reduction technique.
* Reprice the call and puts above and reproduce and add to the table a comparison of the naive Monte Carlo results with the antithetic sampling results. Is there a reduction in the standard error?

### **Problem 3**

* Write another new pricer function titled stratified\_monte\_carlo\_pricer that implements the stratified sampling variance reduction technique.
* Add the new results to the table. Now compare naive Monte Carlo, antithetic Monte Carlo, and stratified Monte Carlo. What do you notice?