For each of these problems, we use the same inputs. Suppose that you have a position consisting of 100 shares of the exchange-traded fund SPY, and 500 European put options, **expiring in one year**, on Apple Computer (AAPL). Assume that the business day is January 4, 2019. I provide the exact data I want you to use in a separate file which you can get off of Canvas. Assume that the volatility of AAPL is 25%, strike of the put is 144, US risk-free rate is 3%, and AAPL's annual dividend yield is 2% (assume continuous yield). Use Black-Scholes (with dividend yield) pricing for the option.

1. Assuming that the only risk factors are stock prices, and that volatilities and interest rates are static, compute the 1-day 99% historical VaR using the 2-years' data in the following ways:
   a. Delta/Gamma approximation, analytical delta and gamma, absolute shifts.
   b. Delta/Gamma approximation, numerical delta and gamma with "optimal" bump size (tell me what that is). Absolute shifts.
   c. Full revaluation, using absolute shifts.
   d. Same as (a), but using relative shifts.
   e. Same as (b), using relative shifts.
   f. Same as (c) using relative shifts.
2. Repeat problem (1), this time doing 97% Expected Shortfall instead of 99% VaR. No need to repeat optimal bump size calculation in (b) and (f).