# CQF Exercise 2.1 Portfolio Theory

1. **The Global Minimum Variance Portfolio** (slide 24).
   - Express the variance of the portfolio returns, $\sigma^2_\Pi(w_A)$ as a sole function of the weight $w_A$ invested in asset $A$ (***Hint:*** use the budget equation $w_B + w_A = 1$).
   - Minimize the function $\sigma^2_\Pi(w_A)$ to find the asset allocation of the global minimum variance portfolio.
   - Under what conditions on $\sigma_A$, $\sigma_B$ and/or $\rho_{AB}$ does this result hold?
2. **The Tangency Portfolio** (slide 42)
   - Find a functional form $S(w^t_A, w^t_B)$ for the slope of the tangency line
   - Express the slope of the tangency line, as a sole function $S(w^t_A)$ of the weight $w^t_A$ invested in asset $A$ (***Hint:*** use the budget equation $w^t_B + w^t_A = 1$).
   - Find the tangency portfolio's asset allocation. (***Hint:*** rather than maximizing $S(w^t_A)$, consider maximizing $S^2(w^t_A)$)
3. What are the economic significance of $\alpha$ and $\beta$ in Sharpe's Market Model and how are they measured or estimated in practice?