Midterm Exam #2 Formula Sheet

Expected Utility

$$E\left(U(W)\right) = \sum_{s=1}^{n} p_s U(W_s).$$

Demand for Insurance

State-Contingent Wealth: $W_s = W_0 - E(I)(1+\lambda) - L_{u,s}$, where

- W_0 = initial wealth;
- $E(I)$ = expected value of the indemnity;
- λ = % premium loading (note: insurance is actuarially fair if $\lambda = 0$);
- $E(I)(1+\lambda)$ = price of insurance, also known as the "insurance premium"; and
- $L_{u,s}$ = the uninsured loss (note: under full coverage, $L_{u,s} = 0$, under coinsurance, $L_{u,s} = (1-\alpha)L_s$ (where α is the coinsurance rate), and under a deductible policy, $L_{u,s} = L_s - Max(L_s - d, 0)$, where d is the deductible.

Portfolio and Capital Market Theory

- σ_i = standard deviation of returns on asset i;
- σ_{ij} = covariance between i and j;
- ρ_{ij} = correlation between i and j = $\sigma_{ij}/\sigma_i\sigma_j$;
- w_i = proportion of portfolio p invested in asset i (note: $\sum_{i=1}^{n} w_i = 1$);
- $E(r_p)$ = expected portfolio return = $\sum_{i=1}^{n} w_i E(r_i)$; if $n = 2$, $E(r_p) = w_1 E(r_1) + w_2 E(r_2)$;
- σ_p^2 = portfolio variance = $\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \sigma_{ij}$; when $n = 2$, $\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_{ij}$;
- r_f = the expected rate of return on a risk-free asset;
- $E(r_m)$ = the expected rate of return on the market portfolio;
- σ_m = the standard deviation of return on the market portfolio;
- Capital Market Line: $E(r_p) = r_f + \left[\frac{E(r_m) - r_f}{\sigma_m}\right]\sigma_p$ for mean-variance efficient portfolios;
- $\beta_i = \sigma_{im}/\sigma_m^2$;
- Capital Asset Pricing Model: $E(r_i) = r_f + \left[E(r_m) - r_f\right]\beta_i$ for individual securities; and
- $\alpha = \frac{(E(r_j) - r_f)}{\sigma_j}\frac{\tau}{\sigma_j}$, where α is the optimal % exposure to the risky asset, $\frac{E(r_j) - r_f}{\sigma_j}$ is the Sharpe Ratio, τ is risk tolerance, and σ_j is asset j's volatility.