UNIVERSITY OF TEXAS AT AUSTIN

HW Assignment 4

CAPM.

Provide your final answer only to the following problem(s):

Problem 4.1. (2 points) Under the **CAPM**, the expected return and the required return of the market portfolio are equal. *True or false?*

Problem 4.2. (2 points) Assume CAPM. Then, the expected return of every available security equals its required return with respect to the market portfolio. *True or false?*

Problem 4.3. (2 points) Assume the assumptions of CAPM. Then, the slope of the **capital market line (CML)** equals the Sharpe ratio of the market portfolio. *True or false?*

Problem 4.4. (2 points) Under the **CAPM**, the expected return and the required return of the market portfolio are equal. *True or false?*

Problem 4.5. (2 points) You are given the following information about stock X and a portfolio P:

- The annual effective risk-free rate is 5%.
- The portfolio's expected return is 0.10 and the its volatility is 0.2.
- The expected return of stock X is 6% and its volatility is 0.3.
- The correlation between the returns of stock X and the portfolio P is 0.2.

Then, the investor holding portfolio P should invest in stock X. *True or false?*

Problem 4.6. (2 points) Under the **CAPM**, the *beta* of the market portfolio is equal to one. *True or false?*

Problem 4.7. (2 points) Assume the **CAPM** assumptions holds. Investors are only allowed to invest in stock A and stock B. One investor invests \$2,000 in stock A and \$3,000 in stock B. Another investor has \$5,000 invested in stock A. Then, necessarily, he has \$7,500 invested in stock B. *True or false?*

Problem 4.8. (2 points) Assume the assumptions of **CAPM** hold. The risk premium of a zero-beta investment equals zero. *True or false?*

Problem 4.9. (5 points) Assume the **Capital Asset Pricing Model** holds.

You are given the following information about stock X, stock Y, and the market:

- The required return and volatility for the market portfolio are 0.08 and 0.25, respectively.
- The required return and volatility for the stock X are 0.06 and 0.4, respectively.
- The correlation between the returns of stock X and the market is -0.25.
- The volatility of stock Y is 0.3.
- The correlation between the returns of stock Y and the market is 0.2.

Calculate the required return for stock Y.

(a) 0.0489
(b) 0.0542
(c) 0.0691
(d) 0.0734
(e) None of the above.

Provide your complete solution(s) to the following problem(s):

Problem 4.10. (10 points) Assume the **CAPM** holds.

Let the risk-free interest rate be 0.05 and let the expected return of a market portfolio be equal to 0.10.

Suppose that stock X has $\beta_X = 1.4$ and that stock Y has $\beta_Y = 0.8$. Using the risk-free asset, stock X, and stock Y, you create a portfolio such that the weight given to X equals the weight given to Y while the weight of the risk-free asset is 0.4. What is the expected return of this portfolio?

Problem 4.11. (9 points) Suppose that your market consists exactly of the five different stocks whose information is given in the following table:

Stock	Price per share	Number of shares outstanding (in 10^6)
1	10	12
2	20	14
3	30	10
4	40	4
5	50	4

What are the portfolio weights in the market portfolio?

Problem 4.12. (10 points) Consider a portfolio of four stocks as displayed in the following table:

Stock	Weight	Beta
1	0.1	1.2
2	0.2	1.4
3	0.5	1.0
4	0.2	β_4

The expected return of the portfolio is 0.12, the annual effective risk-free rate is 0.04, and the market risk premium is 0.06.

Assuming the **Capital Asset Pricing Model**, calculate β_4.