

## UNIVERSITY OF TEXAS AT AUSTIN

HW Assignment 10CAPM.

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

**Problem 10.1.** (2 points) Under the **CAPM**, the expected return and the required return of the market portfolio are equal. *True or false?*

**Problem 10.2.** (2 points) A portfolio is efficient if and only if the expected return of every available security equals its required return with respect to that portfolio. *True or false?*

**Problem 10.3.** (2 points) Assume the assumptions of CAPM. Then, the **capital market line (CML)** is the tangent line of the feasible set going through the market portfolio. *True or false?*

**Problem 10.4.** (2 points) Under the **CAPM**, the expected return and the required return of the market portfolio are equal. *True or false?*

**Problem 10.5.** (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 10.6.** (2 points) Under the **CAPM**, the *beta* of the market portfolio is equal to one. *True or false?*

**Problem 10.7.** (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 10.8.** (2 points) Assume the assumptions of **CAPM** hold. The risk premium of a zero-beta investment equals zero. *True or false?*

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**Problem 10.9.** (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.
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Provide your complete solution(s) to the following problem(s):

**Problem 10.10.** (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 10.11.** (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 10.12.** (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	$\beta_4$

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  $\beta_4$ .