

**FINM3093 Investments  
Test**

**Name:** \_\_\_\_\_ **Student ID:** \_\_\_\_\_

**Date: 4 December 2024**

**Time allowed: 120 minutes**

**Full mark: 100**

1. (4 points) Which statement about portfolio diversification is correct?
  - A. Efficient diversification can reduce or eliminate systematic risk.
  - B. Diversification reduces the portfolio's expected return because it reduces a portfolio's total risk.
  - C. As more securities are added to a portfolio, total risk typically can be expected to fall at a decreasing rate.
  - D. The risk-reducing benefits of diversification do not occur meaningfully until at least 30 individual securities are included in the portfolio.
2. (4 points) Beta and standard deviation differ as risk measures in that beta measures:
  - A. Only unsystematic risk, while standard deviation measures total risk.
  - B. Only systematic risk, while standard deviation measures total risk.
  - C. Both systematic and unsystematic risk, while standard deviation measures only unsystematic risk.
  - D. Both systematic and unsystematic risk, while standard deviation measures only systematic risk.
3. (4 points) The security market line depicts:
  - A. A security's expected return as a function of its systematic risk.
  - B. The market portfolio as the optimal portfolio of risky securities.
  - C. The relationship between a security's return and the return on an index.
  - D. The complete portfolio as a combination of the market portfolio and the risk-free rate.
4. (4 points) Assume that both X and Y are well-diversified portfolios and the risk-free rate is 8%.

Portfolio	Expected Return	Beta
X	16%	1.00
Y	12%	0.25

In this situation you would conclude that portfolios X and Y:

- A. Are in equilibrium
  - B. Offer an arbitrage opportunity
  - C. Are both underpriced
  - D. Are both fairly priced
5. (4 points) The semistrong form of the efficient market hypothesis asserts that stock prices:
  - A. Fully reflect all historical price information.
  - B. Fully reflect all publicly available information.

- C. Fully reflect all relevant information, including insider information.
- D. May be predictable.

6. (25 points)

You manage a risky portfolio,  $P$ , with an expected rate of return 15% and a standard deviation of 22%. T-bills offer a risk-free rate 7%.

a. (3 points) What is the intercept and slope of the capital allocation line (CAL)?

**b. (4 points) The investment budget is \$300,000 and an investor borrows an additional \$120,000, investing the total available funds in the risky asset. Suppose that the borrowing rate is also 7%. What are the expected value and standard deviation of the rate of return on his portfolio?**

- c. (4 points) Suppose the borrowing rate is  $r_f^B = 9\%$ . What are the slopes of the CAL for  $y \leq 1$  and  $y > 1$ , respectively? Draw a diagram of the CAL, accounting for the higher borrowing rate.
- d. (6 points) Consider an investor with degree of risk aversion  $A = 4$ . What proportion of her total investment be invested in the risky portfolio and risk-free asset? What are the expected value and standard deviation of the rate of return on her portfolio?
- e. (4 points) Suppose that the borrowing rate changes from 7% to 9%. If an investor's coefficient of risk aversion is  $A = 1.1$ . How will her optimal portfolio choice be affected by this borrowing rate change? (*Hint*: What are the  $y$  values before and after the change?)
- f. (4 points) Suppose that the borrowing rate changes from 7% to 9%. What is the range of risk aversion,  $A$ , for which an investor will be affected by the higher borrowing rate? What is the range of risk aversion,  $A$ , for which an investor will not be affected by the higher borrowing rate?

7. (25 points)

You have been provided the following data about the securities of three firms, the market portfolio, and the risk-free asset:

Security	Standard Deviation	Correlation*	Beta
Firm A	.31	(i)	.85
Firm B	(ii)	.50	1.40
Firm C	.65	.35	(iii)
The market portfolio	.20	(iv)	(v)
The risk-free asset	(vi)	(vii)	(viii)

\* With the market portfolio.

- a. (16 points) Fill in the missing values in the table. Show your work. (Hint:  $\beta_i = \frac{Cov(r_i, r_M)}{\sigma^2(r_M)} =$

$$\rho_{i,M} \frac{\sigma(r_i)}{\sigma(r_M)})$$

- b. (9 points) The following additional information is given. Is the stock of Firm A correctly priced according to the CAPM? What about the stock of Firm B? Firm C? If these securities are not correctly priced, do you suggest to buy or sell each of them? (Note: You do not need to consider statistical test.)

Security	Expected Return
Firm A	.10
Firm B	.14
Firm C	.16
The market portfolio	.12
The risk-free asset	.05

8. (18 points)

Suppose that there are only two pervasive macroeconomic factors. Investments X, Y, and Z have the following betas to these two factors:

	$\beta_1$	$\beta_2$
X	1.75	.25
Y	-1.00	2.00
Z	2.00	1.00

We assume that the expected risk premium is 4% on factor 1 and 8% on factor 2. Treasury bills offer zero risk premium.

- (3 points) According to the APT, what is the risk premium on each of the three stocks?
- (6 points) Suppose you buy \$200 of X and \$50 of Y and sell \$150 of Z. What is the beta of your portfolio to each of the two factors? What is the expected risk premium?
- (6 points) Suppose you buy \$80 of X and \$60 of Y and sell \$40 of Z. What is the beta of your portfolio to each of the two factors? What is the expected risk premium?
- (3 points) Suggest a possible way that you could construct a fund that has a beta of .5 to factor 1 only. What is the risk premium on this investment?

9. (12 points)

Which of the following observations appear to indicate market inefficiency? Explain whether the observation appears to contradict the weak, semistrong, or strong form of the efficient-market hypothesis. (Hint: Some observations may not indicate any market inefficiency.)

- (3 points) Managers make superior returns on their purchases of their company's stock.
- (3 points) There is evidence that stocks that have appreciated unusually in the recent past

continue to do so in the future.

- c. (3 points) Stocks of companies with unexpectedly high earnings appear to offer high returns for several months after the earnings announcement.
- d. (3 points) Very risky stocks on average give higher returns than safe stocks.

## Appendix

- Minimum-variance portfolio

$$w_{Min}(D) = \frac{\sigma_E^2 - Cov(r_D, r_E)}{\sigma_D^2 + \sigma_E^2 - 2Cov(r_D, r_E)}$$

- Optimal risky portfolio

$$w_D = \frac{E(R_D)\sigma_E^2 - E(R_E)Cov(R_D, R_E)}{E(R_D)\sigma_E^2 + E(R_E)\sigma_D^2 - [E(R_D) + E(R_E)]Cov(R_D, R_E)}, \quad w_E = 1 - w_D$$

where  $R$  denotes the excess return.

