

考 試 科 目	財務管理	系 所 別	財務管理學系	考 試 時 間	2 月 6 日 (五) 第 三 節
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Part I. Multiple-Choice Questions (40 points, 4 pts each. Provide answers only, no explanations required.)

1. You are analyzing a project and have developed the following estimates. The depreciation is \$50,000 a year, and the tax rate is 21 percent. What is the best-case Operating Cash Flow? Please note that taxes can be negative in this question.

	Base-Case	Lower Bound	Upper Bound
Unit sales	12,000	11,000	13,000
Sales price per unit	\$ 33	\$ 31	\$ 35
Variable cost per unit	\$ 37	\$ 36	\$ 38
Fixed costs	\$ 11,000	\$ 10,000	\$ 12,000

- A. -\$35,320
 B. -\$7,670
 C. -\$6,090
 D. \$0
 E. None of the above
2. Shohei Ohtani signed a 10-year, \$700 million contract with the Los Angeles Dodgers in 2023, setting the record for the largest contract in MLB history. The payments are heavily deferred: the Dodgers will pay \$2 million per year for years 1–10, and \$68 million per year for years 11–20. If Ohtani were instead paid an equal annual amount during years 1–10 only (no deferral) with the same present value, what would that annual amount be? Assume end-of-year payments and an annual discount rate of 4.43%.
- A. \$62 million
 B. \$51 million
 C. \$46 million
 D. \$35 million
 E. None of the above
3. Pick the following statement that is most likely to be correct.
- A. When an investor adds international stocks to her purely domestic stock portfolio, it will raise her risk.
 B. A Taiwanese investor looking for effective international diversification should invest about 50% of their money in foreign stocks.
 C. Home bias refers to the tendency to underweight investments in your home country.
 D. When applying an international CAPM for a local Taiwanese investor, we should use the U.S. Treasury bill rate as the risk-free rate.
 E. None of the above.

備 註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。
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4. Select the option that identifies all correct statements below.
- Roll's critique shows that CAPM should include more risk factors.
 - If each firm's environmental score can correctly measure its risk exposure, firms with higher environmental risks should have lower expected returns if we control for other risks.
 - Large firms may be less risky than smaller firms, other things being equal, because they are covered by more analysts, and they are more transparent.
 - A firm enjoys a higher expected return if it is well managed by a capable team, other things being equal.
- i, ii, iii, and iv
 - iii only
 - ii, iii, and iv
 - iii and iv
 - None of the above.
5. Which of the following statements is correct?
- The bond that moves from investment grade to speculative grade is likely to sell for a premium.
 - The current yield tends to understate a bond's total return when the bond sells at a discount because the bond's price will increase each year.
 - A two-year, 9% annual coupon bond with face value of \$1,000 now sells for \$980. You can sell it at the same \$980 a year later if the interest rate stays the same.
 - Convexity is a property investors dislike because bonds gain less in price when yields fall than they gain when yields rise, due to the bond's positive curvature.
 - None of the above.
6. A European call option on a stock with an exercise price of \$75 and an expiration date 1 year from now is worth \$3 today. A European put option on the same stock with the same exercise price and the same expiration date is worth \$2.50 today. The continuously compounded risk-free rate is 8%, and the stock pays no dividends. What is the stock worth today?
- \$69.73
 - \$71.69
 - \$73.12
 - \$77.25
 - None of the above.

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7. Nancy priced both a put and a call on TSLA using an option pricing software. She entered the strike prices of the options, the price of the underlying asset, an estimate of the volatility, an estimate of the risk-free rate, and the time to expiration of the option. She found that both prices calculated by the program were much higher than the observed market values of these two options. Which of the following is the most likely explanation?
- The estimate of the volatility was too high.
 - The estimate of the volatility was too low.
 - The estimate of the risk-free rate was too high.
 - The estimate of the risk-free rate was too low.
 - None of the above.
8. Assume both corporate taxes and financial distress costs apply to a firm. Given this, the static theory (a.k.a. trade-off theory) of capital structure illustrates that:
- A firm receives the greatest benefit from debt financing when its tax rate is relatively low.
 - A firm with a debt-equity ratio of 0.5 or less should issue more debt.
 - The costs of financial distress decrease the value of a firm.
 - The more debt a firm assumes, the greater the incentive to acquire even more debt until such time as the firm is financed with 100 percent debt.
 - At the optimal level of debt, a firm also optimizes its tax shield on debt.
9. Which of the following statements is correct?
- While sensitivity analysis is forward-looking, scenario analysis attempts to analyze the past.
 - The sales level at which the project NPV is zero is called the NPV break-even point.
 - Sensitivity analysis takes into consideration the interrelationships of variables.
 - A project that simply breaks even on an accounting basis recovers the nominal investment amount but does not cover the opportunity cost of the capital tied up in the project.
 - Managers who accept projects that only break even on an accounting basis are helping their shareholders.
10. Which of the following is true?
- The higher the times-interest-earned ratio, the higher the interest expense.
 - The net working capital of a firm will decrease when accrued wages are paid with cash.
 - Other things equal, an increase in accounts receivable will increase a firm's return on assets.
 - A healthy current ratio and an unhealthy quick ratio may be caused by excess inventory.
 - An asset's liquidity measures its proportion of debt financing.

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Part II. Short-Answer Questions (60 points. Questions requiring answers are highlighted in bold.)

1. The sustainable growth rate (g) is the maximum rate at which a company can grow sales using only internally generated equity (retained earnings) and additional debt, while keeping the debt-equity ratio constant. The formula for g is $g = (ROE \cdot b) / (1 - ROE \cdot b)$.
- A. (5pts) **Show how to derive the formula for g in detail. State any necessary assumptions or conditions.** You may use (but are not limited to) the following notation:
 TE_0 : total shareholders' equity at the beginning of the period.
 TE_1 : total shareholders' equity at the end of the period.
 NI_1 : net income earned during the period ending at time 1.
 b : retention ratio (the portion of NI_1 retained in the firm).
 ROE : return on equity, defined as NI_1 / TE_1 (using end-of-period equity).
- B. (5pts) The formula for the forward P/E ratio: $P_0 / E_1 = (1 - b) / (R - g)$ is derived by using the Gordon Growth Model, $P_0 = D_1 / (R - g)$, and the retention ratio b .
Does this formula imply that a higher retention ratio b always leads to a lower forward P/E ratio? Explain.
- C. (5pts) Consider a real-world application. To estimate the fair value of a firm, an analyst first determines the cost of equity. Use the following market data for 2025: the risk-free rate is 4.12%, Nvidia's beta is 2.27, and the market risk premium is 6%. Using Table 1 as needed, **compute Nvidia's cost of equity and discuss why the forward P/E ratio formula does not work for Nvidia in this context.**
- D. (5pts) **Using Table 1, compute Nvidia's theoretical sustainable growth rate g in 2025 using the formula in the introduction.**
Nvidia's actual revenue growth was 114.2% in 2025. **Why are the actual and theoretical sustainable growth rates so different?**

Table 1: Nvidia's selected financial figures in USD millions

Item	FY 2024	FY 2025
Total assets	65,728	111,601
Total shareholders' equity	42,978	79,327
Total liabilities	22,750	32,274
Revenue	60,922	130,497
Net income	29,760	72,880
Addition to retained earnings	29,400	72,066

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2. Let i_{JPY} be the interest rate for the Japanese Yen, i_{USD} be the interest rate for the U.S. Dollar, S_t be the current spot exchange rate (JPY/USD), F_t be the forward exchange rate, and S_{t+1} be the future spot exchange rate at time $t+1$.
- A. (4 pts) The condition of “No Arbitrage” implies that Covered Interest Rate Parity holds. Using this condition, and assuming investors are risk-neutral under the Efficient Market Hypothesis, **show that the forward rate F_t is an unbiased predictor of the future spot rate (i.e., $F_t = E_t [S_{t+1}]$).**
- B. (4 pts) Data as of the end of December 2024: spot rate (S_t): 154.00 JPY/USD, 3-month USD interest rate (i_{USD}): 5.40% (annualized), 3-month JPY interest rate (i_{JPY}): 0.20% (annualized). **Calculate the theoretical 3-month (90-day) forward rate F_t .**
- C. (4 pts) If the market consensus for the spot rate in 3 months is 150.00, **how does this compare to your calculated F_t ? What does this discrepancy imply about market expectations or risk premia?**
- D. (4 pts) On March 31, 2025, the actual spot rate reached 151.00. **Calculate the total 3-month return for an investor who engaged in a carry trade (borrowing JPY to buy USD) without hedging.**
- E. (4 pts) By late 2025, the US-Japan interest rate gap narrowed (the USD interest rate dropped to 4.2%, and the JPY interest rate went up to 0.6%), yet the spot rate rose to 157.50 (i.e., a weaker Yen). **Discuss factors that may explain why the JPY weakened despite the narrower yield spread.**
3. Assume the capital market satisfies all standard CAPM assumptions. There is a risk-free asset available with a return of $R_f = 2\%$. Investors are analyzing two specific portfolios, Portfolio A and Portfolio B, which lie on the efficient frontier of risky assets. The parameters for these portfolios are as follows:

	Variance (σ^2)	Expected Return $E(R)$
Portfolio A	0.01	8%
Portfolio B	0.04	14%

Covariance: The covariance between Portfolio A and Portfolio B is 0.0025.

- A. (4 pts) Consider a portfolio constructed solely from risky assets A and B. Calculate the **weights for asset A and asset B that minimize the total portfolio variance.**
- B. (4 pts) Assume investors can borrow and lend at the risk-free rate ($R_f = 2\%$). To maximize the Sharpe Ratio, **what are the optimal weights (W_A, W_B) for the tangency portfolio?**
- C. (4 pts) Suppose that the assumptions to support this tangency portfolio as the market portfolio all hold. **Calculate the beta coefficients for Portfolio A and Portfolio B.**
- D. (4 pts) Calculate the **market risk premium** and **verify whether the expected returns of A and B satisfy the Security Market Line (SML) equation.**
- E. (4 pts) Suppose there is a third financial asset, asset C, with a beta of 0.9. You estimate its current expected return to be 11%, which is out of equilibrium. Please **describe the market process that will force asset C back to the security market line.**

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