考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

一、Multiple Choice (1 point each)

Identify the letter of the choice that best completes the statement or answers the question.

1. One would expect to observe diminishing marginal product of labor when
   A. workers are discouraged about the lack of help from other workers.
   B. crowded office space reduces the productivity of new workers.
   C. union workers are told to reduce their work effort in preparation for a new round of collective bargaining talks.
   D. only new workers are trained in using the most productive capital.

2. Comparing marginal revenue to marginal cost
(i) reveals the contribution of the last unit of production to total profit.
(ii) is helpful in making profit maximization production decisions.
(iii) always reveals whether a firm is making an economic profit.
(iv) tells a firm whether its fixed costs are too high.
   A. (i) and (ii) only
   B. (iii) only
   C. (ii) and (iii) only
   D. All of the above are correct.

3. The monopolist's profit-maximizing quantity of output is determined by the intersection of which of the following two curves?
   A. marginal cost and demand
   B. average cost and demand
   C. marginal cost and marginal revenue
   D. average cost and marginal revenue

4. One key difference between an oligopoly market and a competitive market is that
   A. oligopolistic firms are interdependent while competitive firms are not.
   B. oligopolistic firms sell completely unrelated products while competitive firms do not.
   C. oligopolistic firms sell their product at a price equal to marginal cost while competitive firms do not.
   D. oligopolistic firms are price takers while competitive firms are not.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

5. When advertising encourages customers to become more informed about all firms in the market,
   A. demand curves for specific brands in the market are likely to become less elastic.
   B. each firm is likely to have less market power.
   C. firms are able to foster stronger brand loyalty.
   D. the market power of individual firms is strengthened.

6. David faces choices between Apple and Banana. He feels that having five apples and three bananas (5,3) is not different from having four apples and six bananas (4,6). Which following statement(s) is (are) possibly correct if Ethan's indifferent curves are downward-sloping?
(i) Ethan feels (4, 4.8) is as good as (5, 3).
(ii) Ethan feels (6, 2) is as good as (4, 6).
   A. (i)
   B. (ii)
   C. (i) and (ii)
   D. None of the above is correct.

7. John and Ethan both work eight hours a day. In one day, John can make 4 cakes or 8 ice cream, whereas Ethan can make 2 cakes or 5 ice cream. Given this, which statement(s) is (are) correct?
(i) Ethan has a lower opportunity cost in producing ice cream than John.
(ii) John has an absolute advantage in producing both goods.
(iii) It is not beneficial for John to trade with Ethan.
   A. (i) and (ii)
   B. (i) and (iii)
   C. (ii) and (iii)
   D. (i), (ii), and (iii)

8. Which following statement(s) is (are) correct?
(i) A Giffen good is always an inferior good.
(ii) A Giffen good is a good that its income effect is larger than its substitution effect.
   A. (i)
   B. (ii)
   C. (i) and (ii)
   D. None of the above is correct.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

9. John, Ethan, and Mary decide to buy a bike together and share the ownership. There willingness to pay for each choice is in the following table

	John	Ethan	Mary
Bike A	$800	$300	$500
Bike B	$700	$450	$500
Bike C	$600	$500	$500
Bike D	$500	$550	$500
Bike E	$400	$650	$500

They will choose the bike that all three agree to buy. Which following statement(s) is(are) correct?
(i) The bike will be a public good among them.
(ii) If three people share the cost and all bikes have the same price, $1500, the choice that maximizes aggregate surplus will be chosen.

A. (i)
B. (ii)
C. (i) and (ii)
D. None of the above is correct.

10. Suppose Country *A* proposes to impose a tax on a good. One report from an economist argues that this tax will increase producers' before-tax total revenue and make the producers bear relatively more tax burden than consumers. Which following statement is correct for the good?

A. The price elasticity of demand is 1.8; the price elasticity of supply is 0.8.
B. The price elasticity of demand is 0.9; the price elasticity of supply is 0.3.
C. The price elasticity of demand is 0.6; the price elasticity of supply is 1.4.
D. There is not enough information to answer the question.

11. In a certain economy, when income is $1000, consumer spending is $800. The value of the multiplier for this economy is 2.5. It follows that, when income is $1060, consumer spending is

A. $815.
B. $836.
C. $900.
D. $950.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

12. Which of the following is not a reason that paying efficiency wages may increase a firm's profit?
A. Efficiency wages increase worker health and therefore increase worker productivity.
B. Efficiency wages decrease worker turnover and therefore decrease hiring and training costs.
C. Efficiency wages decrease worker shirking and therefore increase worker productivity.
D. Efficiency wages are below the equilibrium wage rate but still attract high quality workers.

13. If the Federal Reserve accommodates an adverse supply shock,
A. inflation expectations may rise which shifts the short-run Phillips curve shifts right.
B. inflation expectations may rise which shifts the short-run Phillips curve shifts left.
C. inflation expectations may fall which shifts the short-run Phillips curve shifts right.
D. inflation expectations may fall which shifts the short-run Phillips curve shifts left.

14. If a local bank decides to convert some of its U.S. Treasury securities into cash, which it will hold in its vault, what impact will this have on the bank's balance sheet?
A. Reserves would increase, liabilities would stay the same, and owner's equity would decrease.
B. Reserves would increase, liabilities would stay the same, and owner's equity would increase.
C. Reserves would decrease, liabilities would decrease, and owner's equity would decrease.
D. Reserves would decrease, liabilities would stay the same, and owner's equity would decrease.

15. Matilda just graduated from college. In order to devote all her efforts to college, she didn't hold a job. She is going to tour around the country on her motorcycle for a month before she starts looking for work. Other things the same, the unemployment rate
A. increases, and the labor-force participation rate decreases.
B. and the labor-force participation rate both increase.
C. increases, and the labor-force participation rate is unaffected.
D. and the labor-force participation rate are both unaffected.

16. In an IS-LM model, if the government adopts a loose monetary policy and a tight fiscal policy simultaneously,
A. interest rate increases, while output stays the same.
B. interest rate stays the same, while output decreases.
C. interest rate change is uncertain, while output increases.
D. interest rate decreases, while output changes is uncertain.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

17. In a small open economy, a loose fiscal policy coupled with an increase in import tariff will cause domestic currency to

A. increase.

B. decrease.

C. remain the same.

D. change in an uncertain direction.

18. Assuming, in a two-period model, that the nominal wage rate increases from \$10/hour to \$15/hour; the expected price level increases from 1 to 3; and the actual price level increases from 4 to 5, we can deduce that

A. nominal wage rate decreases.

B. expected real wage rate increases.

C. actual real wage rate increases.

D. All of the above are correct.

19. Suppose the objective function of a government is described by $W(u, \pi) = (u + 5\pi^2)$ where u is the unemployment rate, and π is the inflation rate, while the Phillips curve is described by $\pi = \pi^e - 2(u - u^*)$ where π^e is the expected inflation rate, and u^* is the natural rate of unemployment. Which of the following inflation rate is a credible promise that the government can make?

A. 0%

B. 2%

C. 5%

D. 10%

20. If the central bank announces a decrease in money supply while keeping the actual money supply unchanged, the rational expectations theory would predict

A. both output and price remain unchanged.

B. output increases, while price decreases.

C. output decreases, while price increases.

D. output remains unchanged, while price decreases.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

二、Problems and Short-essay Questions

Please answer the following questions IN SEQUENCE. All questions may be answered in either Chinese or English.

1. Suppose there is a small country. It imports apples at the price of \$10 per bag. The demand curve is $D = 400 - 10P$. The supply curve is $S = 50 + 5P$. The country imposes a specific tariff so that the import is 50 bags. Answer the following questions.

A. (5 points) Calculate the tariff imposed by the country.

B. (5 points) Calculate the tariff revenue.

C. (5 points) Calculate the consumption distortion loss.

D. (5 points) Calculate the production distortion loss.

2. Suppose the demand curve of a specific kind of flower for Country A is $Q^D = 200 - P$, where Q^D is the quantity demanded and P is the price. The supply curve in the same market is $Q^S = 3P$, where Q^S is the quantity supplied.

A. (15 points) Suppose scientists find that the scent of this specific kind of follower can cure mental disorders. Hence, for each unit of the quantity demanded brings \$80 external benefit. Assume the world price P^W is \$60 and is not affected by Country A's policies. Considering this external benefit, should Country A export or import how many units of this good? Please draw a graph and label all relevant points. Also, please show your calculation.

B. (5 points) How can the government deal with the issue of the external benefit that is described above? Please clearly explain your answer.

3. In an imaginary economy, consumers buy only sandwiches and magazines. In 2016, the base year, a sandwich cost \$5 and a magazine cost \$4. The consumers bought 20 sandwiches and 25 magazines at these prices. In 2017, a sandwich cost \$6.

A. (8 points) If the consumer price index in 2017 was 125, then how much did a magazine cost in 2017?

B. (12 points) Suppose that consumers bought 30 sandwiches and 25 magazines in 2017. What was the growth rate of nominal GDP between 2016 and 2017? What was the growth rate of real GDP between 2016 and 2017? What was the GDP deflator in 2017?

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 18 日（一）第一節

4. Consider an economy with a consumption function $C = C_0 + c \cdot Y_d$, where Y_d represents disposable income; an investment function $I = I_0 - b \cdot r$, where r represents interest rate; tax revenue $T = T_0 + t \cdot Y$, where t represents tax rate; transfer payment TP; a money demand function $L = k \cdot Y - h \cdot r$; a money supply function, $M = M_0/P$, where M_0 is the nominal money supply controlled by the central bank, and P represents the general price level.

A. (10 points) Derive the equilibrium output level Y^* when the goods market and the money market are in equilibrium simultaneously.

B. (10 points) Discuss how Y^* is related to nominal money supply, and how this relationship is affected by h.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	統計學 A	系所別	金融學系金融管理組	考試時間	2 月 18 日(一) 第 3 節

Part 1: Short Answer Questions

Mark the blank number and write your answer on the answer sheet. Do NOT provide any details. Each blank worths 5 points.

- If X and Y are independent standard normal distributions, the distribution of $U = X/Y$ is __(1)__, and its moment generating function is __(2)__.

- If the random variable X is $N(\theta, \theta)$, it is clear that $E(X^2) =$ __(3)__, and $(1/n)\sum_{i=1}^{n} X_i^2$ converges in probability to __(4)__.

- Consider a random sample of size n from the distribution $f(x) = \exp(-x)$, $0 < x < \infty$. If $\overline{X}$ is the mean of this random sample and $Y = \sqrt{n}(\overline{X} - 1)$, the asymptotic distribution of Y is __(5)__. If $Z = \sqrt{n}\left(\sqrt{\overline{X}} - 1\right)$, the asymptotic distribution of Z is __(6)__.

- Consider a random sample of size n from the distribution $f(x) = \theta(1-x)^{\theta-1}$, $0 < x < 1$, $\theta > 0$. The maximum likelihood estimator for θ is __(7)__, and the likelihood ratio statistic for testing $H_0 : \theta = 1$ against $H_1 : \theta \neq 1$ is __(8)__.

- Consider a liner model $Y_i = \beta_0 + u_i$, $i = 1, 2, ..., n$ and $u_i \sim N(0, \sigma_u^2)$ is independent over i. The maximum likelihood estimator for σ_u^2 is $\widehat{\sigma}_u^2 =$ __(9)__, and $Var(\widehat{\sigma}_u^2) =$ __(10)__.

- Consider a model $\Pr(Y_i = 1|X_{1i}, X_{2i,...,}X_{ki}) = \Lambda(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki})$ where Y is a binary variable and

$$\Lambda(z) = \frac{\exp(z)}{1 + \exp(z)}.$$

The log-likelihood of this model is -401.25 while that of the model with intercept only is -498.65. The average marginal effect of X_1 on Y can be expressed by __(11)__, and the pseudo R^2 is __(12)__.

- The return of a financial asset can be described by $r_t = 0.002 + \epsilon_t + 0.05\epsilon_{t-1}$ where $\epsilon_t \sim N(0, \sigma_\epsilon^2)$ is a random sequence. The theoretical correlation of r_t and r_{t-1} is __(13)__, and the long-run sharpe ratio for this asset is __(14)__.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	統計學 A	系所別	金融學系金融管理組	考試時間	2 月 18 日(一) 第 3 節

Part 2: Long Answer Questions

Be sure to provide all necessary details with your answers. Each question worths 10 points.

1. Consider a random sample Y_i of size n with the unknown population mean μ_Y. Explain how to test the hypothesis $\mu_Y = c$ by running a linear regression and show that this test statistic is exactly the same as the usual $\sqrt{n}\left(\overline{Y} - c\right)/s_Y$, where $\overline{Y}$ is the sample mean and s_Y is the sample standard deviation.

2. Let M_{t+1} be the stochastic discount factor and C_t be the aggregate consumption. The process for consumption growth is

$$\ln\left(\frac{C_{t+1}}{C_t}\right) = \mu_c + \sigma_c \epsilon_{c,t+1},$$

where $\epsilon_{c,t+1} \sim N(0,1)$. A classical asset pricing theory states that

$$M_{t+1} = \beta\left(\frac{C_{t+1}}{C_t}\right)^{-\gamma},$$

and

$$R^f_{t+1} = \frac{1}{E_t\left(M_{t+1}\right)} - 1,$$

where R^f_{t+1} is the risk-free rate. If $\beta = 0.99$, $\gamma = 5$, $\mu_c = 0.0016$ and $\sigma_c = 0.0025$, what is the risk-free rate implied by this theory?

3. The table below displays the performance of a model in predicting economic recessions.

Cut point	Sensitivity	Specificity
0.2	0.9718	0.1517
0.3	0.8767	0.3608
0.4	0.6527	0.5898

Calculate the area under the Receiver Operating Characteristic Curve and comment on the performance of this model.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學 108 學年度 碩士暨碩士在職專班 招生考試試題

考試科目	財務管理	系所別	金融學系(金融管理組)	考試時間	2 月 18 日(一) 第二節

I. Explain the following term briefly (24 points, 4 points for each)

1. Strong-form efficient.
2. Random walk.
3. Value as a going concern.
4. The current yield of a bond
5. Convertible bond.
6. Senior debt.

II. Computational Questions (30 points, 5 points for each)

1. The market portfolio has an expected return of 18% and the risk-free rate is 6%. An investor borrows $100 at the risk-free rate and invests this and a further $100 of his own in the market portfolio. What is his expected return?
2. A stock is expected to pay a year-end dividend of $8 and then to sell at a price of $109. The risk-free interest rate is 4%, the expected market return is 12% and the stock has a beta of 0.8. What is the stock price today?
3. Suppose that the total value of dividends to be paid by companies in the Narnian stock market index is $100 billion. Investors expect dividends to grow over the long term by 5% annually, and they require a 10% return. Now a collapse in the economy leads investors to revise their growth estimate down to 4%. By how much should market values change?
4. How much of a stock's $30 price is reflected in PVGO if it expects to earn $4 per share, has an expected dividend of $2.50, and a required return of 20%?
5. An all-equity firm has 1 million shares outstanding with a market value of $10 million. It does not pay tax and has an operating income of $1.5 million. If $2 million of 10% debt is issued and the proceeds used to repurchase shares of stock, what does then the firm's EPS change?
6. A stock is currently priced at $65 per share and will pay a $4 dividend in one year. What must the stock sell for in one year to meet investors' expectations of a 15% after-tax return if dividends are taxed at 28% and there are no capital gains taxes?

III. Short Answer Questions (10 points , 5 points for each)

1. Why are Investors willing to purchase stocks having high P/E ratios?
2. Which of the following pair of firms do you think should be more highly levered: A retailing firm with prime downtown real estate, or a social media company whose major assets are its unique software and client loyalty? And why?

考試科目	財務管理	系所別	金融學系(金融管理組)	考試時間	2 月 18 日(一) 第二節

IV. Questions (36 points)

1. Astromet is financed entirely by common stock and has a beta of 1.0. The firm pays no taxes. The stock has a price-earnings multiple of 10 and is priced to offer a 10% expected return. The company decides to repurchase half the common stock and substitute an equal value of debt. Assume that the debt yields a risk-free 5%. Calculate

a. the beta of the common stock after the refinancing. (5 points)

b. the required return and risk premium on the common stock before the refinancing. (4 points)

c. the required return and risk premium on the common stock after the refinancing. (6 points)

Assume that the operating profit of the firm is expected to remain constant. Give

d. the percentage increase in earnings per share after the refinancing. (6 points)

e. the new price-earnings multiple. (Hint: Has anything happened to the stock price?) (5 points)

2. Plank's Plants had net income of $2,000 on sales of $50,000 last year. The firm paid a dividend of $500. Total assets were $100,000, of which $40,000 was financed by debt.

a. What is the firm's sustainable growth rate? (5 points)

b. What would be the maximum possible growth rate if the firm did not issue any debt next year? (5 points)

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	統計學B	系所別	金融學系財務工程與金融科技組	考試時間	2月18日(一)第2節

1. (25 points)

(a) Let X be a real-valued random variable with density function f given by:

$$f(x) = \begin{cases} k(9-x^2) & \text{if} \quad 0 \le x \le 3 \\ 0 & \text{else} \end{cases} \tag{1}$$

for some constant $k > 0$.

1. (5 points) Find the value of k such that f is indeed a density function (i.e. it must integrate to 1).
2. (5 points) Evaluate $E(X)$.
3. (5 points) Evaluate $Var(X)$.

(b) Let Y be a real-valued random variable with $E(Y) = \frac{5}{4}$ and $Var(Y) = \frac{101}{80}$.

1. (5 points) Evaluate $E(XY)$.
2. (5 points) Evaluate $Var(X+Y)$.

2. (25 points) Suppose that X and Y are two independent random variables which are exponentially distributed with parameter $\lambda = 1$. That is, X and Y both have Exponential(1)-distribution, with corresponding density functions being f_X and f_Y defined as $f_X(x) = e^{-x} \cdot 1_{\{x \ge 0\}}$ and $f_Y(y) = e^{-y} \cdot 1_{\{y \ge 0\}}$ respectively.

Let $T = X + Y$.

(a) (5 points) Find the joint density of the random vector (X, Y).

(b) (10 points) Find the joint density of the random vector (X, T).

(c) (5 points) Find the marginal density of T.

(d) (5 points) Find the conditional density of X given $T = 1$.

3. (25 points) Let X be a normally distributed random variable with an unknown mean μ and a known variance equal to 1. Suppose that a prior distribution for μ is available, which is standard-normal. Assume further that we observe $X = x$ in an experiment. Derive the posterior distribution of μ given $X = x$ and hence determine the Maximum a Posteriori estimate of μ given $X = x$.

4. (25 points) Recall that for a Pareto distribution with parameters γ and m, its density function can be defined as follows:

$$f(x) = \begin{cases} \frac{\gamma m^{\gamma}}{x^{\gamma+1}} & \text{if } x \ge m \\ 0 & \text{else} \end{cases} \tag{2}$$

Consider, in modeling insurance claims, one observes the arrivals of n claims with values $x_1, x_2, ..., x_n$. For $i = 1, ..., n$, assume that each x_i follows a Pareto distribution.

(a) (10 points) Define and compute the likelihood function, $L(\gamma, m | x_1, x_2, ..., x_n)$, and hence compute the log-likelihood function.

(b) (10 points) For a fix m, derive the maximum likelihood estimate for the parameter γ.

(c) (5 points) For a fixed γ, find the maximum likelihood estimate for the parameter m .

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。