國立政治大學九十八 學年度轉學生入學考試命題紙

考試科目	經濟學	系別	風管系	考試時間	7月10日 星期五 第二節

選擇題請在答案卡上作答，否則不予計分。 (20題，各題5分)

1. If we want to investigate the change in the share of spending on computers relative to spending on all goods and services, we would calculate
   a. the price of computers divided by the overall price level.
   b. computer spending divided by the overall price level.
   c. computer spending as a share of GDP.
   d. the ratio of computer spending to the price of computers.
   e. the change in computer prices.

2. A decrease in interest rates will cause
   a. a rightward shift in the investment share line.
   b. a downward movement along the investment share line.
   c. a leftward shift in the investment share line.
   d. an upward movement along the investment share line.
   e. the investment share line to become steeper.

3. Which of the following best describes the relationship between interest rates and net exports?
   a. The relationship is positive.
   b. There is no relationship because both imports and exports are unaffected by interest rates.
   c. The relationship is negative.
   d. It is not possible to determine the relationship between the two because exports are negatively related to interest rates and imports are positively related to interest rates.
   e. It is not possible to determine the relationship between the two because exports are positively related to interest rates and imports are negatively related to interest rates.

4. Suppose the government share of GDP is 25 percent, and the consumption, investment, and net export shares of GDP are 60, 12, and 3 percent, respectively. If the dollar exchange rate increases, then we would expect

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命題委員： （簽章）98 年 6 月 26 日

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a. the government share of GDP to increase.
b. the interest rate to decrease.
c. the interest rate to increase.
d. the government share of GDP to decrease.
e. the net export share of GDP to increase.

5. Which of the following would lower the amount of investment crowded out by an increase in government purchases?
a. A less interest-rate-sensitive exchange rate
b. Imports becoming less exchange-rate sensitive
c. A more interest-rate-sensitive exchange rate
d. Government purchases becoming less interest-rate sensitive
e. Exports becoming less exchange-rate sensitive

6. The Coase theorem works provided that
a. the transactions costs of an agreement are above a high level.
b. the transactions costs associated with an agreement are low compared to the costs of the externality itself.
c. the costs of an externality itself are low compared to the transactions costs of an agreement.
d. both parties are willing to negotiate with each other.
e. transactions costs of an agreement are high compared to the costs of the externality itself.

7. A private agreement between bargainers may not take place because of
a. free-rider problems.
b. negative externalities.
c. the tragedy of the commons.
d. positive externalities.
e. all of these.

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8. Emission taxes have an advantage over taxes on production in that
   a. they change the firm's output whereas taxes on production do not.
   b. the firm's amount of pollution associated with its production will not change.
   c. the firm can use technology to change the amount of pollution associated with its production.
   d. they do not raise the firm's prices whereas taxes on production do.
   e. the firm can increase the amount of pollution associated with a given amount of production.

9. The economically desirable thing about product variety is
   a. that there is always free entry and exit.
   b. that different individuals' diverse tastes are satisfied.
   c. the increased economic activity that results from it.
   d. that many firms participate in a market with product variety.
   e. the freedom it gives firms to produce in slightly different ways.

10. With monopolistic competition, market demand is
   a. constantly changing.
   b. horizontal.
   c. the same as firm demand.
   d. nonexistent.
   e. like any other market demand.

11. Strategic behavior refers to
   a. the situation where what is best for firm A depends on what firm B does and what is best for B depends on what A does.
   b. the behavior of monopoly firms that must take into account the actions of competitors.
   c. the situation where what is best for firm A depends on what firm A does and what is best for firm B depends on what firm B does.
   d. the behavior of a firm attempting to increase its profits at the expense of

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competitors.

e. the behavior of firms in monopolistic competition.

12. Because marginal cost increases as output increases,

a. marginal product increases at an increasing rate.

b. the total cost curve gets steeper as output increases.

c. the fixed cost curve gets steeper as output increases.

d. the total product curve gets steeper as output increases.

e. the total cost curve becomes horizontal.

13. If price is greater than marginal cost and output is infinitely divisible, then

a. decreasing output will decrease revenue less than it decreases cost.

b. increasing output will increase revenue more than it increases cost.

c. increasing output will increase revenue less than it increases cost.

d. decreasing output will increase revenue more than it increases cost.

e. increasing output will have no effect on revenue and cost.

14. As a measure of money, M1 emphasizes the use of money as

a. an illiquid asset.

b. a unit of account.

c. a standard of deferred payment.

d. a medium of exchange.

e. a store of value.

15. Suppose banks desire to keep five percent of their deposits on reserve. If the Central Bank purchases $20 million worth of government bonds from Bank INF, the amount of bonds and loans Bank INF holds will

a. decrease by $15 million.

b. decrease by $20 million.

c. increase by $15 million.

d. remain unchanged.

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e. increase by $20 million.

16. Which of the following statements is true when the central bank increases reserves by buying a government bond from a bank?

a. The amount of reserves in the banking system will increase by an amount greater than the amount of the bond purchase.
b. The amount of loans made by the banking system will increase by the amount of the bond purchase.
c. The amount of loans made by that bank will be greater than the increase in reserves.
d. The amount of deposits made by the banking system will increase by the amount of the bond purchase.
e. The amount of reserves in the banking system will increase by the amount of the bond purchase.

17. Suppose the expenditure line is given by the equation E = 800 + .75Y, and output is equal to 3,000. Which of the following is true?

a. There is an incentive for firms to increase output.
b. Spending is less than income.
c. Spending is equal to income.
d. The economy is in equilibrium.
e. There is too much output.

18. If the marginal propensity to consume declines, then

a. for any given change in income, there will be a smaller change in saving.
b. nothing will happen to the consumption function.
c. for any given change in income, there will be a larger change in consumption.
d. for any given change in consumption, there will be a smaller change in income.
e. for any given change in income, there will be a smaller change in

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consumption.

19. Free entry and exit means that
a. banks charge no interest on a loan to start a firm.
b. there are no artificial impediments to entering and exiting an industry.
c. no investment is necessary in order to enter an industry.
d. it costs nothing to start a firm.
e. a firm is free to enter and exit a nation without having to pay high tax levies.

20. Refer to the following table . Suppose the profit-maximizing, competitive firm hires 5 workers and the output price is $15. Then the wage per week must be
a. less than $180.
b. less than or equal to $180 but greater than $135.
c. $135 or less.
d. exactly $180.
e. greater than $180.

Number of Workers Employed per Week	Marginal Product of Labor per Week
1	30
2	25
3	20
4	16
5	12
6	9
7	6

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命題委員： （簽章）98 年 6 月 26 日

考試科目	微積分	系別	風管系	考試時間	7月10日 星期3 第四節

Please choose the closest answer. 選擇題請在答案卡上作答，否則不予計分。

1.(7%)

Let f be a differentiable function such that:

$$f(x+h)-f(x)=3x^2h+3xh^2+h^3+2h \quad \text{for all } x \text{ and } h, \text{ and } f(0)=1$$

Let $g(x)=e^{-x}f(x)$. Calculate $g'(3)$.

(A) $-34e^{-3}$ (B) $-29e^{-3}$ (C) $-5e^{-3}$ (D) $-4e^{-3}$ (E) $63e^{-3}$

2. (7%)

Determine $\lim_{n\to\infty}\frac{1}{n}\left(e^{1/n}+e^{2/n}+\cdots+e^{n/n}\right)$.

(A) 0 (B) 1 (C) $e-1$ (D) e (E) ∞

3. (7%)

A life insurance company invests 5,000 in a bank account in order to fund a death benefit of 20,000. Growth in the investment over time can be modeled by the differential equation $\frac{dA}{dt}=Ai$ where i is the interest rate and $A(t)$ is the amount invested at time t (in years). Calculate the interest rate that the investment must earn in order for the company to fund the death benefit in 24 years.

(A) $\frac{-\ln 2}{12}$ (B) $\frac{-\ln 2}{24}$ (C) $\frac{\ln 2}{24}$ (D) $\frac{\ln 2}{12}$ (E) $\frac{\ln 2}{6}$

4. (7%)

Let $f(x)=\frac{2x}{x+1}$.

Define: $f^2(x)=f(f(x))$

$$f^3(x)=f(f^2(x))$$

$$\vdots$$

$$f^n(x)=f(f^{n-1}(x))$$

Determine $\lim_{n\to\infty}f^n(x)$ for $x>0$.

(A) 0 (B) 1 (C) 2 (D) x (E) $\frac{1}{x}$

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命題委員： （簽章） 98年 6月 17日

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5.(6%)

A particle travels along the curve defined by $x = t^2 - 7t + 2$ and $y = \frac{t^2}{4} - 6t$ for $t \geq 0$. Determine the time t at which the minimum speed occurs.

(A) $\frac{7}{2}$ (B) 4 (C) $\frac{21}{2}$ (D) 12 (E) 24

6. (6%)

An insurance company has 150,000 to spend on the development and promotion of a new insurance policy for renters. If x is spent on the development and y is spent on the promotion, $100x^{1/4}y^{1/2}$ policies will be sold. Calculate the maximum sales, in thousands, the company can attain.

(A) 398 (B) 435 (C) 453 (D) 473 (E) 487

7. (6%)

Let $\{a_n\}$ be a sequence of real numbers.

For which of the following does the infinite series $\sum_{n=1}^{\infty}\left(a_n + \frac{1}{n}\right)$ converge?

(A) $a_n = 1$ (B) $a_n = \frac{1}{n}$ (C) $a_n = \frac{1}{n^2}$ (D) $a_n = \frac{(-1)^n}{n}$ (E) $a_n = \frac{1-n}{n^2}$

8. (6%)

The volume, V, and the surface area, S, of a spherical balloon with radius r are:

$$V = \frac{4}{3}\pi r^3, \text{ and } S = 4\pi r^2.$$

The volume of the balloon increases at a rate of 60 cm^3/min when the balloon's diameter is 6 cm. How fast is the surface area of the balloon increasing when the balloon's diameter is 6 cm?

(A) 20 cm^2/min (B) 40 cm^2/min (C) 80 cm^2/min (D) 113 cm^2/min (E) 120 cm^2/min

9. (6%)

Let R be the region bounded by the graph of $x^2 + y^2 = 9$.

Calculate $\iint_R (x^2 + y^2 + 1)\,dA$.

(A) 24π (B) $\frac{99}{4}\pi$ (C) $\frac{81}{2}\pi$ (D) $\frac{99}{2}\pi$ (E) $\frac{6723}{4}\pi$

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命題委員： （簽章） 98 年 6 月 27 日

考試科目	微積分	系別	風管系	考試時間	7月10日 星期五 第四節

10. (6%)

The rate at which a disease spreads through a town can be modeled by the differential equation $\frac{dQ}{dt} = Q(N-Q)$ where $Q(t)$ is the number of residents infected at time t and N is the total number of residents. Which of the following is a solution for $Q(t)$?

(A) ae^t where a is a constant (B) $\frac{aNe^t - 1}{ae^t}$ where a is a constant

(C) $\frac{aNe^t + 1}{ae^t}$ where a is a constant (D) $\frac{aNe^{Nt}}{1 - ae^{Nt}}$ where a is a constant

(E) $\frac{aNe^{Nt}}{1 + ae^{Nt}}$ where a is a constant

11. (6%)

The number of items produced by a manufacturer is given by $p = 100\sqrt{xy}$, where x is the amount of capital and y is the amount of labor. At a particular point in time:

(i) the manufacturer has 2 units of capital;
(ii) capital is increasing at a rate of 1 unit per month;
(iii) the manufacturer has 3 units of labor; and
(iv) labor is decreasing at a rate of 0.5 units per month.

Determine the rate of change in the number of items produced at the given time.

(A) 41 (B) 61 (C) 82 (D) 102 (E) 245

12. (6%)

The coordinates of an object moving in $\boldsymbol{R}^2$ are:

$$x = 4\sin\frac{t}{2}, \text{ and } y = 2t\cos t \text{ for time } t > 0.$$

Calculate the length of the velocity vector of the object at time $t = \frac{\pi}{2}$.

(A) $\sqrt{2}$ (B) π (C) $\sqrt{\pi^2+2}$ (D) $\sqrt{\pi^2+4}$ (E) $\pi+\sqrt{2}$

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考試科目	微積分	系別	風管系	考試時間	7月10日 星期 2 第四節

13. (6%)

An equation of the line tangent to the graph of a differentiable function f at $x=0$ is $y=3x+4$.

Determine $\lim_{x\to 0}\dfrac{xf(x)}{\sin(2x)}$.

(A) 0 (B) 1 (C) 2 (D) 4 (E) The limit does not exist.

14. (6%)

Let C be the curve in $\boldsymbol{R}^3$ defined by $x=t^2, y=4t^{3/2}, z=9t,$ for $t\geq 0$.

Calculate the distance along C form $(1,4,9)$ to $(16,32,36)$.

(A) 6 (B) 33 (C) 42 (D) 52 (E) 597

15. (6%)

In a certain town, the number of deaths in year t due to a particular disease is modeled by $\dfrac{90,000}{(t+3)^3}$ for $t=1,2,3\ldots$.

Let N be the total number of deaths that the model predicts will occur in the town after the end of the 27^{th} year. Which of the following intervals contains N?

(A) $39.5\leq N<43.0$ (B) $43.0\leq N<46.5$ (C) $46.5\leq N<50.0$ (D) $50.0\leq N<53.5$ (E) $53.5\leq N<57.0$

16. (6%)

An advertising executive claims that, through intensive advertising, 175,000 of a city's 3,500,000 people will recognize the client's product after one day. He further claims that product recognition will grow as advertising continues according to the relationship $a_{n+1}=0.95a_n+175,000$, where a_n is the number of people who recognize the client's product n days after advertising begins. If the advertising executive's claims are correct, how many of the city's 3,500,000 people will not recognize the client's product after 35 days of advertising?

(A) 552,227 (B) 561,468 (C) 570,689 (D) 581,292 (E) 611,886

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命題委員： （簽章） 98年 6月 27日