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I. Multiple Choice (1 points each)

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

- Holding all other forces constant, when the price of gasoline rises, the number of gallons of gasoline demanded would fall substantially over a ten-year period because
 - buyers tend to be much less sensitive to a change in price when given more time to react.
 - buyers tend to be much more sensitive to a change in price when given more time to react.
 - buyers will have substantially more real income over a ten-year period.
 - the quantity supplied of gasoline increases very little in response to an increase in the price of gasoline.
- Suppose that Mike is filling out a survey. The survey asks him what he would do if the price of his favorite shaving gel increased. Mike reports that he would switch to a different brand. The survey then asks what he would do if the price of all shaving gels increased. Mike reports that he must use shaving gel, so he would have to adjust his spending elsewhere. These examples illustrate the importance of
 - changes in total revenue in determining the price elasticity of demand.
 - the definition of a market in determining the price elasticity of demand.
 - a necessity versus a luxury in determining the price elasticity of demand.
 - the time horizon in determining the price elasticity of demand.
- Suppose that Elmer's hourly wage increases, and he decides to work fewer hours. For Elmer, the substitution effect of the wage change is
 - greater than the income effect.
 - equal to the income effect.
 - smaller than the income effect.
 - We do not have enough information with which to answer the question.
- In the work-leisure trade-off analysis, if tax reductions induce a consumer to work more, an explanation for this occurrence is that
 - leisure is an inferior good.
 - leisure is a Giffen good.
 - the substitution effect dominates the income effect.
 - the income effect dominates the substitution effect.

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- 作答於試題上者，不予計分。
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5. Which of the following production functions exhibits constant returns to scale?

- A. $Q = K \cdot L$.
- B. $Q = K^{0.4} \cdot L^{0.4}$.
- C. $Q = K + L - 2$.
- D. $Q = 2K + 3L$.

6. Consider a market demand function $Q = e^{3600 + \ln \frac{1}{(p+8)^3}}$. There is a monopolist in the market with no fixed cost, and its marginal cost is \$8 at all levels of output. What price will it charge to maximize its profits?

- A. 20
- B. 12
- C. 10
- D. 16

7. Josh sells mojos as a monopolist in a market with two consumers, Lyle and Yu-Min. Lyle's demand function for mojos is $Q_L = 20 - P_L$. Yu-Min's demand function is $Q_Y = 10 - P_Y$. Josh only knows there are two consumers but does not know who has a higher demand. Therefore, he decides to offer two options $O_1 = (q_1, m_1)$ and $O_2 = (q_2, m_2)$. If a consumer chooses O_i , he pays m_i dollars to buy q_i mojos. Consumers can only choose one offer, and resale is not allowed. If Josh wants to practice 2nd-degree price discrimination, which of the following offers should he use?

- A. $O_1 = (20, 200)$ and $O_2 = (10, 50)$
- B. $O_1 = (20, 125)$ and $O_2 = (8, 48)$
- C. $O_1 = (20, 140)$ and $O_2 = (6, 42)$
- D. $O_1 = (20, 165)$ and $O_2 = (4, 32)$

8. In the game matrix below, the first payoff in each pair goes to player A who chooses the row, and the second payoff goes to player B, who chooses the column. Let a, b, c and d be positive constants.

Player B

		Left	Right
Player A	Top	$a, 1$	$b, 0.5$
	Bottom	$1, c$	$2, d$

If the game only has a mixed-strategy Nash equilibrium, then we can conclude that

- A. $b > a$ and $d > c$.
- B. $a > 1$ and $d < 0.5$.
- C. $a < 1$ and $b > 2$.
- D. None of the above is correct.

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9. Concerts in Taipei Dome cause noise and earthquake-like vibrations for surrounding residents. According to an estimation, there are 1,000 residents affected, and the average mental damage per concert for each resident is $D_R = 5 + Q$, where Q stands for the number of concerts per month. On the other hand, the monthly concert revenue of Taipei Dome is $R_T = 10,000Q - 1,000Q^2$. The marginal cost of holding each concert is 1,000. What is the socially optimal number of concerts?

- A. 1
- B. 3
- C. 5
- D. 7

10. Which of the following is not a characteristic of a public good?

- A. It is not excludable.
- B. It is not diminished or depreciated as additional people consume the good.
- C. Its benefits cannot be withheld from anyone.
- D. Because it is a free good, there is no opportunity cost.

11. Which of the following events would decrease the unemployment rate?

- A. A decrease in the labor force combined with an increase in the total population.
- B. A decrease in the labor force, with no change in the number of employed workers.
- C. A decrease in the number of employed workers, with no change in the labor force.
- D. An increase in the labor force, with no change in the number of employed workers.

12. Which of the following policies is considered quantitative easing?

- A. The central bank prints money and directly transfers it to financial institutions.
- B. The central bank purchases short-term government bonds.
- C. The central bank sells short-term government bonds.
- D. The central bank purchases long-term government bonds.

13. In the long run, what is the primary cause of inflation?

- A. Increase in the minimum wage.
- B. Government's currency manipulation.
- C. Growth in the money supply.
- D. Protective trade policies and high tariff rates.

14. All else being equal, which of the following outcomes would we expect from a decrease in Taiwan's interest rates?

- A. Citizens decide to hold more foreign bonds.

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B. Citizens choose to hold more currency.

C. Domestic business owners decide to invest in new equipment for their factory.

D. All of the above are correct.

15. If inflation expectations rise, the short-run Phillips curve shifts:

A. to the right, so that at any inflation rate, unemployment is higher in the short run than before.

B. to the left, so that at any inflation rate, unemployment is higher in the short run than before.

C. to the right, so that at any inflation rate, unemployment is lower in the short run than before.

D. to the left, so that at any inflation rate, unemployment is lower in the short run than before.

16. In a world described by the classical dichotomy, assuming GDP and the price level are given, if President Trump raises U.S. import tariffs while all other factors remain unchanged, how will this policy affect Taiwan's loanable funds market?

A. The real interest rate will increase.

B. The real interest rate will decrease.

C. The real interest rate will stay the same.

D. It will shift both the demand and supply of loanable funds simultaneously.

17. Consider a partial equilibrium model for good *A* in Taiwan. If President Trump raises U.S. import tariffs on that good, thereby reducing Taiwan's export prices, and assuming Taiwan is a small country and the U.S. is a large country in the market for good *A*, how will this affect Taiwan's consumer surplus?

A. It will increase.

B. It will decrease.

C. It will stay the same.

D. The change will be ambiguous.

18. If President Trump raises U.S. import tariffs, assuming all other factors remain unchanged, how will this policy affect Taiwan's economy according to the classical Keynesian model?

A. The output will decrease but the price level will increase.

B. Both the output and price level will decrease.

C. The output will decrease but the price level will stay the same.

D. The output will increase but the price level will stay the same.

19. If President Trump raises U.S. import tariffs and leads to workers in the associated industries in Taiwan losing their jobs and other things being equal, how will this affect the natural rate of unemployment in Taiwan?

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- A. It will increase.
- B. It will decrease.
- C. It will stay the same.
- D. It depends on how the cyclical unemployment rate changes.

20. In the long run, assuming GDP and price level are given, if investors in Taiwan fear that President Trump will raise the U.S. import tariff in the near future and other things equal, how will this affect Taiwan's economics?

- A. An increase in net export of Taiwan and a rise in the real interest rate
- B. A drop in net export of Taiwan and a rise in the real interest rate
- C. An increase in net export of Taiwan and a drop in the real interest rate
- D. A drop in net export of Taiwan and a drop in the real interest rate

II. Problems and Short-essay Questions

1. A competitive market currently has 120 firms, all of which has a total cost function of $TC(q) = 9 + 11q + q^2$, where q denotes the quantity produced by each firm.

a. (10 points) Currently, the market price $p = 19$. What is the total quantity supplied in the market? How much profit does each firm make in the short-run equilibrium?

b. (5 points) What is the long-run equilibrium price? Suppose the market demand is given by $p = 35 - \frac{1}{30}Q$, where Q denotes the market quantity demanded. How many firms are there in the long-run equilibrium?

c. (5 points) Suppose now the government levies a \$2 specific tax on each unit of the output produced. How many firms are there in the long-run equilibrium?

2. An industry has two firms, A and B , producing output at constant unit costs of 1 and $C > 1$ per unit, respectively. The demand function for the industry is

$$Q = \frac{V}{P}$$

with $V > C$.

a. (10 points) Suppose two firms are Cournot competitors. Find the equilibrium price, quantities produced, and profits for two firms.

b. (10 points) Suppose two firms are Bertrand competitors. Moreover, when both firms set identical prices, all consumers purchase from the more cost-efficient firm. Find the equilibrium price, quantities produced, and profits for two firms.

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3. Consider consumers in Country *A* and Country *B*, who each consumes 2 units of bananas and 5 units of pizza every year. The currency unit of Country *A* is AD, and the currency unit of Country *B* is BD. Please answer the following questions in detail:

a. (10 points) Assume that in year 2000, the prices of bananas and pizza in Country *A* were 3 AD and 5 AD, respectively, and the prices of these items in Country *B* were 2 BD and 2 BD. Suppose the purchasing power parity holds between the two countries. What was the nominal exchange rate of AD in terms of BD in year 2000?

b. (5 points) Does the law of one price hold according to the information in (a)? Why or why not?

c. (5 points) In 2001, the price of bananas and pizza in Country *A* became 2 AD and 6 AD, respectively. Please calculate the CPI index of Country *A* in 2001, using 2000 as the base year.

4. In this question, we will examine the monetary and fiscal policies of Country *Z*. The economy of Country *Z* is described by the following equations:

$$Y = C + I + G$$

$$C = 100 + 0.5(Y - T)$$

$$I = 300 - 50r$$

where Y is GDP, C is consumption, I is investment, G is government spending, T is taxes, and r is the real interest rate (for example, if the real interest rate is $q\%$, then $r = q$).

Country *Z* has recently experienced a significant negative economic shock. The president plans to implement policies aimed at stimulating the economy. At first, the president considers an expansionary fiscal policy and the corresponding multiplier effect.

a. (2 points) What is the marginal propensity to consume (MPC) in this economy?

b. (3 points) Calculate the fiscal multiplier.

c. (5 points) Suppose Country *Z* receives foreign aid, which enables an increase in government spending without raising taxes. Given a change in government spending ($\Delta G = 50$) and no change in taxes ($\Delta T = 0$), what is the resulting increase in aggregate demand?

In Country *Z*, the nominal interest rate is fixed at 8%. The current growth rate of the money supply is 7%, and the current inflation rate is 5%. To stimulate investment, the central bank increases the growth rate of the money supply to 9%.

d. (2 points) What is the inflation rate after the central bank's monetary policy?

e. (3 points) Referring to the Fisher effect (Fisher equation), calculate the new real interest rate after the monetary policy.

f. (5 points) Given the change in the real interest rate, calculate the change in investment (ΔI). What is the resulting increase in aggregate demand?

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1. Just answer True (T) or False (F) for each of the following questions, 1.a. to 1.j. (20%, 2% each)
- An interval estimator is a random interval containing the true parameter value with some probability.
 - The sample mean has always a normal distribution regardless of the underlying, or population, distribution.
 - Knowing the null distribution of a hypothesis test and the decision rule allows one to calculate the probability of types I and II error.
 - Linear regression can fit curves other than lines to given data.
 - The p -value gives the probability of making a type I error.
 - If the null hypothesis is true, then the p -value will always be larger than the significance level.
 - A p -value below the significance level allows us to conclude with certainty that the null hypothesis is false.

For the following 4 questions, 1.h. to 1.j., assuming that a two-sample t -test for equal means of two populations has a p -value of 0.06,

- For a significance level of 0.05, the null hypothesis of equal means should be rejected.
 - A 95% confidence interval for the difference of the means for the two populations includes 0.
 - With probability 0.95, the actual value of the difference of the means is within the 95% t -confidence interval for the difference.
2. Skittles are a popular brand of fruit-flavored candies known for their colorful, hard candy shell and chewy interior. They are produced and marketed by the Wrigley Company, which is a division of the Mars, Incorporated. According to the Wrigley Company, each packet of Skittles is designed to have an equal proportion of the five main colors: red, orange, yellow, green, and purple. Murphy decides to test this claim. She buys 20 Standard (2-ounce) packets of Skittles. Assume that there are approximately 60 Skittles per packet, and Murphy has exactly a total of 1200 Skittles. She counts each color and observes the following counts of Skittles.

	Red	Orange	Yellow	Green	Purple	Total
Counts	215	220	240	260	265	1200

Conduct a hypothesis test at the 0.05 significance level to test whether the published Skittles color distribution is correct. Carefully state what you are testing and your conclusion. (Use numbers in tables on p.3~p.5 for interpolation, if necessary.) (15%)

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3. The Pareto distribution is often used in business modeling, such as analyzing sales data to determine that a small number of products often generate the majority of revenue. It has the following probability density function

$$f_X(x|\theta) = \begin{cases} \frac{\theta x_m^\theta}{x^{\theta+1}}, & x \geq x_m, \\ 0, & x < x_m. \end{cases}$$

where x_m is some fixed constant representing the minimum value of x , and $\theta > 0$. Assume x_1, \dots, x_n are n independent observations from a Pareto distribution, derive the maximum likelihood estimator of θ . (15%)

4. Two friends, Mike and Jane are meeting up for dinner. They plan to meet at 6pm. Both get off work around 5pm, and have to ride a bus to the restaurant during rush hours. So, neither of them will be early. Also, due to rush hour traffic, they will both arrive between 0 and 1 hour late. Let M be the time in hours that Mike arrives late, and let J be the time in hours that Jane arrives late. Assume that the joint probability density function of these two random variables is

$$f_{M,J}(m,j) = \frac{5}{4} - m \times j.$$

- Derive the marginal probability density function for the random variable J . (5%)
 - Find the expected value and the variance of the random variable J . (10%)
 - Are M and J independent? Why or why not? (5%)
 - Compute the correlation between the two random variables, M and J . (5%)
 - Set up, but do not solve, an expression that computes the probability that Mike and Jane arrive within 15 minutes (0.25 hours) of each other and that Mike arrives after Jane. (5%)
5. Assume that $(-4, 0.75)$, $(-1, 0.75)$, $(1, 2.5)$ are three pairs of data, (x_i, y_i) , generated from the following model:

$$y = \beta|x + 3| + \varepsilon,$$

where β is a constant and ε is an independent random variable.

- What other assumptions are required on ε so that it makes sense to fit a least squares curve $y = \beta|x + 3|$ to the data? (5%)
- Derive the least squares estimator for β , and compute its estimate $\hat{\beta}$ (round to the first decimal place) with the three given data points. (10%)
- Draw a graph of your estimated least squares curve along with the three data points. (5%)

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Standard Normal table of left tail probabilities

$$\Phi(z) = P(Z \leq z) \text{ for } N(0, 1).$$

z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$
-4.00	0.0000	-2.00	0.0228	0.00	0.5000	2.00	0.9772
-3.95	0.0000	-1.95	0.0256	0.05	0.5199	2.05	0.9798
-3.90	0.0000	-1.90	0.0287	0.10	0.5398	2.10	0.9821
-3.85	0.0001	-1.85	0.0322	0.15	0.5596	2.15	0.9842
-3.80	0.0001	-1.80	0.0359	0.20	0.5793	2.20	0.9861
-3.75	0.0001	-1.75	0.0401	0.25	0.5987	2.25	0.9878
-3.70	0.0001	-1.70	0.0446	0.30	0.6179	2.30	0.9893
-3.65	0.0001	-1.65	0.0495	0.35	0.6368	2.35	0.9906
-3.60	0.0002	-1.60	0.0548	0.40	0.6554	2.40	0.9918
-3.55	0.0002	-1.55	0.0606	0.45	0.6736	2.45	0.9929
-3.50	0.0002	-1.50	0.0668	0.50	0.6915	2.50	0.9938
-3.45	0.0003	-1.45	0.0735	0.55	0.7088	2.55	0.9946
-3.40	0.0003	-1.40	0.0808	0.60	0.7257	2.60	0.9953
-3.35	0.0004	-1.35	0.0885	0.65	0.7422	2.65	0.9960
-3.30	0.0005	-1.30	0.0968	0.70	0.7580	2.70	0.9965
-3.25	0.0006	-1.25	0.1056	0.75	0.7734	2.75	0.9970
-3.20	0.0007	-1.20	0.1151	0.80	0.7881	2.80	0.9974
-3.15	0.0008	-1.15	0.1251	0.85	0.8023	2.85	0.9978
-3.10	0.0010	-1.10	0.1357	0.90	0.8159	2.90	0.9981
-3.05	0.0011	-1.05	0.1469	0.95	0.8289	2.95	0.9984
-3.00	0.0013	-1.00	0.1587	1.00	0.8413	3.00	0.9987
-2.95	0.0016	-0.95	0.1711	1.05	0.8531	3.05	0.9989
-2.90	0.0019	-0.90	0.1841	1.10	0.8643	3.10	0.9990
-2.85	0.0022	-0.85	0.1977	1.15	0.8749	3.15	0.9992
-2.80	0.0026	-0.80	0.2119	1.20	0.8849	3.20	0.9993
-2.75	0.0030	-0.75	0.2266	1.25	0.8944	3.25	0.9994
-2.70	0.0035	-0.70	0.2420	1.30	0.9032	3.30	0.9995
-2.65	0.0040	-0.65	0.2578	1.35	0.9115	3.35	0.9996
-2.60	0.0047	-0.60	0.2743	1.40	0.9192	3.40	0.9997
-2.55	0.0054	-0.55	0.2912	1.45	0.9265	3.45	0.9997
-2.50	0.0062	-0.50	0.3085	1.50	0.9332	3.50	0.9998
-2.45	0.0071	-0.45	0.3264	1.55	0.9394	3.55	0.9998
-2.40	0.0082	-0.40	0.3446	1.60	0.9452	3.60	0.9998
-2.35	0.0094	-0.35	0.3632	1.65	0.9505	3.65	0.9999
-2.30	0.0107	-0.30	0.3821	1.70	0.9554	3.70	0.9999
-2.25	0.0122	-0.25	0.4013	1.75	0.9599	3.75	0.9999
-2.20	0.0139	-0.20	0.4207	1.80	0.9641	3.80	0.9999
-2.15	0.0158	-0.15	0.4404	1.85	0.9678	3.85	0.9999
-2.10	0.0179	-0.10	0.4602	1.90	0.9713	3.90	1.0000
-2.05	0.0202	-0.05	0.4801	1.95	0.9744	3.95	1.0000

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Table of Student-*t* critical values (right-tail)

The table shows $t_{df,p}$ = the $(1 - p)$ quantile of a t-distribution with df degree of freedom.

df\p	0.005	0.010	0.015	0.020	0.025	0.030	0.040	0.050	0.100	0.200	0.300	0.400	0.500
1	63.66	31.82	21.20	15.89	12.71	10.58	7.92	6.31	3.08	1.38	0.73	0.32	0.00
2	9.92	6.96	5.64	4.85	4.30	3.90	3.32	2.92	1.89	1.06	0.62	0.29	0.00
3	5.84	4.54	3.90	3.48	3.18	2.95	2.61	2.35	1.64	0.98	0.58	0.28	0.00
4	4.60	3.75	3.30	3.00	2.78	2.60	2.33	2.13	1.53	0.94	0.57	0.27	0.00
5	4.03	3.36	3.00	2.76	2.57	2.42	2.19	2.02	1.48	0.92	0.56	0.27	0.00
6	3.71	3.14	2.83	2.61	2.45	2.31	2.10	1.94	1.44	0.91	0.55	0.26	0.00
7	3.50	3.00	2.71	2.52	2.36	2.24	2.05	1.89	1.41	0.90	0.55	0.26	0.00
8	3.36	2.90	2.63	2.45	2.31	2.19	2.00	1.86	1.40	0.89	0.55	0.26	0.00
9	3.25	2.82	2.57	2.40	2.26	2.15	1.97	1.83	1.38	0.88	0.54	0.26	0.00
10	3.17	2.76	2.53	2.36	2.23	2.12	1.95	1.81	1.37	0.88	0.54	0.26	0.00
16	2.92	2.58	2.38	2.24	2.12	2.02	1.87	1.75	1.34	0.86	0.54	0.26	0.00
17	2.90	2.57	2.37	2.22	2.11	2.02	1.86	1.74	1.33	0.86	0.53	0.26	0.00
18	2.88	2.55	2.36	2.21	2.10	2.01	1.86	1.73	1.33	0.86	0.53	0.26	0.00
19	2.86	2.54	2.35	2.20	2.09	2.00	1.85	1.73	1.33	0.86	0.53	0.26	0.00
20	2.85	2.53	2.34	2.20	2.09	1.99	1.84	1.72	1.33	0.86	0.53	0.26	0.00
21	2.83	2.52	2.33	2.19	2.08	1.99	1.84	1.72	1.32	0.86	0.53	0.26	0.00
22	2.82	2.51	2.32	2.18	2.07	1.98	1.84	1.72	1.32	0.86	0.53	0.26	0.00
23	2.81	2.50	2.31	2.18	2.07	1.98	1.83	1.71	1.32	0.86	0.53	0.26	0.00
24	2.80	2.49	2.31	2.17	2.06	1.97	1.83	1.71	1.32	0.86	0.53	0.26	0.00
25	2.79	2.49	2.30	2.17	2.06	1.97	1.82	1.71	1.32	0.86	0.53	0.26	0.00
30	2.75	2.46	2.28	2.15	2.04	1.95	1.81	1.70	1.31	0.85	0.53	0.26	0.00
31	2.74	2.45	2.27	2.14	2.04	1.95	1.81	1.70	1.31	0.85	0.53	0.26	0.00
32	2.74	2.45	2.27	2.14	2.04	1.95	1.81	1.69	1.31	0.85	0.53	0.26	0.00
33	2.73	2.44	2.27	2.14	2.03	1.95	1.81	1.69	1.31	0.85	0.53	0.26	0.00
34	2.73	2.44	2.27	2.14	2.03	1.95	1.80	1.69	1.31	0.85	0.53	0.26	0.00
35	2.72	2.44	2.26	2.13	2.03	1.94	1.80	1.69	1.31	0.85	0.53	0.26	0.00
40	2.70	2.42	2.25	2.12	2.02	1.94	1.80	1.68	1.30	0.85	0.53	0.26	0.00
41	2.70	2.42	2.25	2.12	2.02	1.93	1.80	1.68	1.30	0.85	0.53	0.25	0.00
42	2.70	2.42	2.25	2.12	2.02	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
43	2.70	2.42	2.24	2.12	2.02	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
44	2.69	2.41	2.24	2.12	2.02	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
45	2.69	2.41	2.24	2.12	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
46	2.69	2.41	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
47	2.68	2.41	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
48	2.68	2.41	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
49	2.68	2.40	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00

考試科目	統計學	系所別	國際經營與貿易學系 國際經營組一般生	考試時間	2月12日(星期三) 第四節
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Table of χ^2 critical values (right-tail)

The table shows $\chi^2_{df,p}$ = the $(1 - p)$ quantile of a χ^2 -distribution with df degree of freedom.

df \ p	0.010	0.025	0.050	0.100	0.200	0.300	0.500	0.700	0.800	0.900	0.950	0.975	0.990
1	6.63	5.02	3.84	2.71	1.64	1.07	0.45	0.15	0.06	0.02	0.00	0.00	0.00
2	9.21	7.38	5.99	4.61	3.22	2.41	1.39	0.71	0.45	0.21	0.10	0.05	0.02
3	11.34	9.35	7.81	6.25	4.64	3.66	2.37	1.42	1.01	0.58	0.35	0.22	0.11
4	13.28	11.14	9.49	7.78	5.99	4.88	3.36	2.19	1.65	1.06	0.71	0.48	0.30
5	15.09	12.83	11.07	9.24	7.29	6.06	4.35	3.00	2.34	1.61	1.15	0.83	0.55
6	16.81	14.45	12.59	10.64	8.56	7.23	5.35	3.83	3.07	2.20	1.64	1.24	0.87
7	18.48	16.01	14.07	12.02	9.80	8.38	6.35	4.67	3.82	2.83	2.17	1.69	1.24
8	20.09	17.53	15.51	13.36	11.03	9.52	7.34	5.53	4.59	3.49	2.73	2.18	1.65
9	21.67	19.02	16.92	14.68	12.24	10.66	8.34	6.39	5.38	4.17	3.33	2.70	2.09
10	23.21	20.48	18.31	15.99	13.44	11.78	9.34	7.27	6.18	4.87	3.94	3.25	2.56
16	32.00	28.85	26.30	23.54	20.47	18.42	15.34	12.62	11.15	9.31	7.96	6.91	5.81
17	33.41	30.19	27.59	24.77	21.61	19.51	16.34	13.53	12.00	10.09	8.67	7.56	6.41
18	34.81	31.53	28.87	25.99	22.76	20.60	17.34	14.44	12.86	10.86	9.39	8.23	7.01
19	36.19	32.85	30.14	27.20	23.90	21.69	18.34	15.35	13.72	11.65	10.12	8.91	7.63
20	37.57	34.17	31.41	28.41	25.04	22.77	19.34	16.27	14.58	12.44	10.85	9.59	8.26
21	38.93	35.48	32.67	29.62	26.17	23.86	20.34	17.18	15.44	13.24	11.59	10.28	8.90
22	40.29	36.78	33.92	30.81	27.30	24.94	21.34	18.10	16.31	14.04	12.34	10.98	9.54
23	41.64	38.08	35.17	32.01	28.43	26.02	22.34	19.02	17.19	14.85	13.09	11.69	10.20
24	42.98	39.36	36.42	33.20	29.55	27.10	23.34	19.94	18.06	15.66	13.85	12.40	10.86
25	44.31	40.65	37.65	34.38	30.68	28.17	24.34	20.87	18.94	16.47	14.61	13.12	11.52
30	50.89	46.98	43.77	40.26	36.25	33.53	29.34	25.51	23.36	20.60	18.49	16.79	14.95
31	52.19	48.23	44.99	41.42	37.36	34.60	30.34	26.44	24.26	21.43	19.28	17.54	15.66
32	53.49	49.48	46.19	42.58	38.47	35.66	31.34	27.37	25.15	22.27	20.07	18.29	16.36
33	54.78	50.73	47.40	43.75	39.57	36.73	32.34	28.31	26.04	23.11	20.87	19.05	17.07
34	56.06	51.97	48.60	44.90	40.68	37.80	33.34	29.24	26.94	23.95	21.66	19.81	17.79
35	57.34	53.20	49.80	46.06	41.78	38.86	34.34	30.18	27.84	24.80	22.47	20.57	18.51
40	63.69	59.34	55.76	51.81	47.27	44.16	39.34	34.87	32.34	29.05	26.51	24.43	22.16
41	64.95	60.56	56.94	52.95	48.36	45.22	40.34	35.81	33.25	29.91	27.33	25.21	22.91
42	66.21	61.78	58.12	54.09	49.46	46.28	41.34	36.75	34.16	30.77	28.14	26.00	23.65
43	67.46	62.99	59.30	55.23	50.55	47.34	42.34	37.70	35.07	31.63	28.96	26.79	24.40
44	68.71	64.20	60.48	56.37	51.64	48.40	43.34	38.64	35.97	32.49	29.79	27.57	25.15
45	69.96	65.41	61.66	57.51	52.73	49.45	44.34	39.58	36.88	33.35	30.61	28.37	25.90
46	71.20	66.62	62.83	58.64	53.82	50.51	45.34	40.53	37.80	34.22	31.44	29.16	26.66
47	72.44	67.82	64.00	59.77	54.91	51.56	46.34	41.47	38.71	35.08	32.27	29.96	27.42
48	73.68	69.02	65.17	60.91	55.99	52.62	47.34	42.42	39.62	35.95	33.10	30.75	28.18
49	74.92	70.22	66.34	62.04	57.08	53.67	48.33	43.37	40.53	36.82	33.93	31.55	28.94

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

微積分

系所別

國際經營與貿易學系

考試時間

7 月 12 日 (三) 第 4 節

• Show all work for full credit.

1. (10%) Compute the double integral $\iint_R \frac{x}{y+1} dx dy$, where R is the triangle with vertices $(0,0), (1,1), (2,0)$.

2. (10%) Find a function $f(x)$ and a number a such that $3 + \int_a^{x^3} \frac{f(t)}{t^2} dt = 6x$ for all $x \in \mathbb{R}$.

3. (10%) Determine if the improper integral $\int_1^{\infty} \frac{x^3 + x^2 + x + 1}{x^4 + x^3 + x^2 + x + 1} dx$ converges or not.

4. (10%) Find the interval of convergence for the power series $\sum_{n=2}^{\infty} \frac{(2x)^n}{\ln n}$.

5. (10%) Find the limit $\lim_{x \rightarrow 0} \frac{x}{|\sin^2 x - \cos x| - |3 \sin x + \cos x|}$.

6. (10%) Test if the series $\sum_{n=1}^{\infty} \frac{2n + \cos n + \sin n}{1001n^2 - n}$ converges or not.

7. (10%) A boy starts walking north from point P at a rate of 4 miles per hour. At the same time, a girl starts jogging west from point P at a rate of 6 miles per hour. After 15 minutes, at what rate is the distance between them changing?

8. (15%) Find the absolute maximum and minimum values of the function $f(x,y) = 5 + 2x - x^2 - 4y^2$ on the region $R = \{(x,y) \mid -1 \leq x \leq 3, -1 \leq y \leq 1\}$.

9. (15%) Compute the following integrals:

a. $\int_1^{e^2} \frac{5 + 2 \ln x}{x(1 + \ln x)^2} dx$

b. $\int_0^1 \frac{1}{(4 - x^2)^{3/2}} dx$

c. $\int_1^e (\ln x)^2 dx$

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	國際經貿時事分析	系所別	國際經營與貿易學系/國際經貿法組一般生	考試時間	2 月 12 日(三) 第 2 節
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本試題共四題，第一題及第二題為申論題，第三題及第四題為評論題，每題 25 分（各子題 12.5 分）。請依考生所學專業知識與分析方法，針對所詢問題之指示扼要作答。

- 一、2022 年 8 月 16 日，美國拜登總統簽署《降低通膨法》(Inflation Reduction Act)。此法案投入 3,690 億美元用以減緩氣候變遷與能源安全，可謂美國迄今在解決氣候危機上最大的一筆投資，並使美國更接近實現其溫室氣體減量目標。此法案投資項目廣泛，包括對能源研究的直接投資、關鍵礦物加工及零組件製造、對電動車製造商之貸款、對改善能源效率與清潔能源轉型之跨部門補助、以及對清潔能源生產、清潔能源投資與電動車購買等之稅收抵免。其中，此法提供美國再生能源與電動車設備製造商三項稅收優惠政策：(1) 先進製造業生產抵免：但特定零組件（如葉片、逆變器、光伏晶片、太陽能模組）必須在美國製造或持有並於美國境內銷售一定比例之產品、(2) 增加符合國內成分要求的能源項目的「生產稅收抵免」與「投資稅收抵免」：此適用於各種再生能源項目，包括風力和太陽能發電廠。此法對於滿足國內成分要求的生產或投資稅收抵免增加 10%~40% 的抵免金額，並根據此法，如該產品（或零件）之製造成本不低於該設施或項目總成本的 40%（對於離岸風電設施為 20%），則該產品便可視為在美國生產，而具備符合受此等優惠之資格。(3) 電動車抵免：但必須滿足(a)電池中一定百分比的「關鍵礦物」需在美國或與美國簽訂自由貿易協定的國家提取或加工，或在北美回收時，並且(b)一定百分比的電池需在北美製造或組裝。亦即，對於 2023 年至 2032 年間投入使用的車輛，此法將用新的清潔車輛稅收抵免取代現有的電動車稅收抵免，價值高達 7,500 美元，包含兩個 3,750 美元的部分：(a)當電池中一定比例的關鍵礦物在美國或與美國簽訂自由貿易協定的國家提取或加工或在北美回收時，即可滿足第 1 部分。到 2027 年，適用的百分比每年增加 10%，屆時電池中 80% 的關鍵礦物質必須符合這些規定。(b)當一定比例的電池在北美製造或組裝時，將滿足第 2 部分；即自 2024 年 1 月 1 日起，至少 50% 的電動車電池零件必須在北美生產/製造，到 2029 年每年增加 10%，屆時 100% 的電池成分必須符合這些規定。滿足其中一項要求（而非兩項要求）的車輛最多可獲得 3,750 美元的抵免額。中國於 2024 年 3 月 26 日對美國此法相關措施提出 WTO 控訴，認為此法對電動車的「歧視性補貼」政策，將中國產品排除在外，有損其在電動車產業的利益。並表示：「這些補貼打著因應氣候變遷、減少碳排、保護環境的幌子，實際上是用來採購或使用美國本土生產，或是特定地區的進口產品」。中方強調，提出申訴是為了維護中國電動車產業的合法權益，以及維護全球市場的公平競爭環境。美國代表則強調，此法在為美國、盟友以及合作夥伴所共同希望的清潔能源產業未來做出貢獻，反控中方利用不公平、非市場政策，來為中國製造商牟利。試問：
- (一) 何謂「補貼」(Subsidy)？WTO 對補貼之「要件」與「類型」有何規定？中國控訴美國《降低通膨法》前開政策措施違反 WTO 補貼之規範，是否有理由？
 - (二) 何謂「國內成分要求」(Local Content Requirements)？依據中國控訴，此等國內成分要求可能違反哪些 WTO 的規定？美國可能主張的抗辯理由為何？
- 二、美國商務部產業安全局 (Bureau of Industry and Security, BIS) 於 2022 年 10 月 7 日公告透過對《出口管制條例》(Export Administration Regulations, EAR) 之修正，限制若干先進半導體、超級電腦產品、先進半導體製造設備對中國輸出。同時，美國增加對美國人 (U.S. Person) 的出口活動限制。首先，該規則對某些先進計算半導體晶片、超級電腦最終用途的交易以及涉及實體清單上某些實體的交易實

考 試 科 目	國際經貿時事分析	系 所 別	國際經營與貿易學系/國際經貿法組一般生	考 試 時 間	2 月 12 日(三) 第 2 節
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施限制性出口管制。其次，該規則對某些半導體製造項目和某些積體電路（IC）最終用途的交易施加新的控制。具體來說，該規則：(1)將某些先進及高效能運算晶片以及包含此類晶片的電腦商品新增至商業管制清單（CCL）；(2)在中國用於超級電腦或半導體開發或生產最終用途的物品增加新的許可證要求；(3)擴大 EAR 的範圍，涵蓋某些外國生產的先進運算產品及外國生產的超級電腦最終用途產品；(4)將需要許可證要求的外國生產產品的範圍擴大到實體清單上位於中國的 28 個現有實體；(5)在 CCL 加入某些半導體製造設備及相關項目；(6)對運往中國境內製造符合規定的 IC 的半導體製造「工廠」的物品增加新的許可證要求。中國實體擁有的設施的許可證將面臨「推定拒絕」核發許可證的決定，至於其他跨國公司擁有的設施將根據具體情況決定。(7)限制美國人在未經許可的情況下支持在某些位於中國的半導體製造「工廠」開發或生產 IC 的能力；(8)對開發或生產半導體製造設備及相關物品的出口物品增加新的許可證要求；(9)建立臨時通用許可證，透過允許與在中國境外使用的物品相關的特定、有限的製造活動，最大限度地減少對半導體供應鏈的短期影響。對此，中國於 2022 年 12 月 12 日向 WTO 控訴美國前開有關半導體晶片出口管制措施，認為已違反 WTO 貿易規則，威脅全球產業鏈供應鏈穩定，破壞國際經貿秩序。試問：

- (一) WTO 對於「出口管制」(Export Control) 措施之相關規定為何？中國對前開出口管制措施得主張違反哪些 WTO 協定的貿易規範？
- (二) 美國在 WTO 架構下可以主張哪些抗辯的理由，藉以正當化前開出口管制措施？

三、General Council Chair welcomes “significant progress” in dispute settlement reform talks:

The General Council Chair, Ambassador Petter Ølberg of Norway, has welcomed the “significant progress” made in the ongoing negotiations on dispute settlement reform, which is taking place under the purview of the General Council. The Chair noted the significant amount of work done during the last six months, which included approximately 170 hours of plenary technical meetings. Summarizing the progress made thus far, he said members have now a draft negotiating document on appeal/review reforms that would: (i) narrow the claims reviewable on appeal/review to those that would have a material impact on the respondent's implementation obligations; (ii) clarify adjudicators' role with respect to reviewing the panel's objective assessment of the facts of the case; (iii) make changes to the existing interim review stage of the panel process such that it provides a more meaningful opportunity for the panel to correct factual or legal errors; and (iv) clarify Members' expectations with respect to adherence to timeframes. On accessibility, the Chair emphasized that members have a near-final draft chapter addressing capacity building and technical assistance. The text: (1) recognises the special needs of developing country and LDC Members; (2) instructs the Secretariat to undertake additional tailored activities and support; (3) establishes a dialogue between Members and the Secretariat; and (4) establishes a review and reporting mechanism to the DSB. In addition, a detailed Annex lays out Members' current needs and considerations as articulated by the proponents themselves. The Chair added that the more contentious issue of “Costs and Funding” has also seen significant progress, with a first draft table now produced capturing the interests and concerns of members. Regarding the way forward, he intends to hold consultations with interested delegations early next year to hear views on how to build on progress made in a manner that would further advance dispute settlement reform work.

考 試 科 目	國際經貿時事分析	系 所 別	國際經營與貿易學系/國際經貿法組一般生	考 試 時 間	2 月 12 日(三) 第 2 節
<p>根據 WTO 此段關於爭端解決制度改革的報導，試問：</p> <p>(一) 目前 WTO 對上訴審查機制所提出的改革內容與項目有哪些？</p> <p>(二) 目前 WTO 為促進開發中國家會員近用爭端解決制度的改革方案與內容有哪些？</p> <p>四、<u>Facilitator seeks members' views on proposed workplan for e-commerce:</u></p> <p>Ambassador Richard Brown of Jamaica, the facilitator of the e-commerce work programme, sought members' views on 12 November 2024 on a workplan which aims to provide a structure for members' discussions on e-commerce between now and the next Ministerial Conference due to take place in early 2026. The goal is to present recommendations for action under the work programme at the 14th Ministerial Conference (MC14), in line with the decision taken at MC13 earlier this year. The workplan is based on discussions among members since MC13. It contains several suggestions and recommendations put forward by members as well as priority interventions or action points that can be taken. In addition, it includes examples of existing initiatives by international organizations addressing e-commerce. The aim of the plan is to capture what the WTO and members can do in response to the priorities and issues raised by members. The topics that members aim to address in the plan are legal and regulatory frameworks, digital trade facilitation, the digital divide, the moratorium on customs duties on electronic transmissions, and additional issues such as emerging technologies and climate change. Ambassador Brown said: "I am hoping that from this workplan, we will be able to work on some specific, targeted priority deliverables for MC14." Members welcomed the workplan. In their preliminary feedback, they underscored the importance of prioritizing specific topics in the coming months, such as the moratorium, capacity building and bridging the digital divide. The facilitator noted that the upcoming thematic discussion in December will focus on the moratorium. Members also expressed interest in sharing experiences and collecting information on the imposition of non-discriminatory taxes on electronic transmissions. They were also supportive of a mapping exercise to identify available technical assistance and capacity building activities on e-commerce. The facilitator shared with members a snapshot of the various Aid for Trade initiatives in support of digital trade, including support measures implemented by the WTO and other intergovernmental organizations with expertise on e-commerce and digital trade.</p> <p>根據 WTO 此段關於電子商務工作方案(計畫)的報導，試問：</p> <p>(一) 此次會議所設定的開會目的或目標為何？</p> <p>(二) 此次會議所提出供會員討論的工作計畫優先項目或具體內容有哪些？</p>					
備 註	<p>一、作答於試題上者，不予計分。</p> <p>二、試題請隨卷繳交。</p>				