

國立中山大學100學年度碩士班招生考試試題

科目：個體經濟學【經濟所碩士班】

1. Consumer 1 has expenditure function $e_1(p_1, p_2, u_1) = u_1 \sqrt{p_1 p_2}$ and consumer 2 has utility function $u_2(x_1, x_2) = x_1^3 x_2^a$. Consumer 1 has income m_1 , and consumer 2 has income m_2 . (10%)
 - a. What are the Marshallian demand functions for each of the goods by each of the consumers? (5%)
 - b. For what value of the parameter a will there exist an aggregate demand function that is independent of the distribution of income? (5%)
2. Two firms are involved in duopoly. The demand function is $p = a - q$. The cost function for each firm is $c_i(q_i) = c \cdot q_i, \forall i = 1, 2$. Find out the Stackelberg equilibrium with firm 1 as the leader in quantity-setting. (10%)
3. Consider a firm with the production function $y = x_1^a x_2^b$, in which y is output, x_i is input for $i = 1, 2$ and $a, b > 0, a + b < 1$. Denote the output price as p , and the input prices as w_1 and w_2 , all of which are determined by the competitive market. Find out the factor demand function for x_1 . (10%)
4. What are the first and the second degree price discriminations? Do they both meet the criterion of Pareto efficiency? Why? (10%)
5. Mr. Chen has von Neumann and Morgenstern utility function $u(y) = \sqrt{y}$, in which y is income. A lottery with 60 percent probability winning NT\$100 and 40 percent probability winning NT\$25 is for sale at the price of NT\$70 in the market. Will Mr. Chen buy this lottery? What is the highest price that he will be willing to buy it? (10%)

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6. (15 pts) There are two firms. Firm 1 produce good x in a perfectly competitive market and the price is p . With the production x at a cost $c(x)$, it also imposes a cost $e(x)$ on firm 2. This means that for every unit x produced, a unit of "pollution" is produced with it. Let the profits functions of firm 1 and firm 2 be $px - c(x)$ and $-e(x)$, respectively. This is what we call the problem of **externality**. Consider the following solutions:

- (a) (5 pts) If internalizing the externality is possible, please compare the output level before and after the internalization.
- (b) (5 pts) Please identify the rate of Pigovian tax.
- (c) (5 pts) Now, assume that the pollution can be sold and bought at a unit price r , please show that when the demand and supply of the pollution are equal, the pollution level is the same as the one in case (a). Is r positive or negative? Explain.

7. (20 pts) Please find all Nash equilibria, both pure and mixed, in the following game. Player 1 can play B or S. Player 2 can play B, S or X.

		Player 2		
		B	S	X
Player 1	B	4,2	0,0	0,1
	S	0,0	2,4	1,3

8. (15 pts) The ECFA was signed last summer and the early-harvested items were traded according to the new terms starting from Jan. 1, 2011. Many economists are worried about that the wages in Taiwan will converge to the wage level in mainland China. This is called Factor-Price Equalization which is predicted by the Heckscher-Ohlin model. Please explain why the model has such a prediction. Moreover, please present two reasons that cause this prediction to be inaccurate.

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科目：統計學【經濟所碩士班】

Answer the following five questions, equally weighted

1.(20%)

Suppose that we have two normal populations with samples of size 25 are drawn from each population, what is the probability that the mean of sample 1 is greater than the mean of sample 2 ?

Population 1: $\mu = 40, \sigma = 6$;

Population 2: $\mu = 38, \sigma = 8$.

2.(20%)

Let $\mathbf{x} = (X_1, X_2, X_3)'$ have a trivariate normal distribution with means 6, 4, and 2, variances 16, 25, and 64 and $cov(X_1, X_2) = 6, cov(X_1, X_3) = cov(X_2, X_3) = 0$. Let $Y_1 = 2X_1 + 3X_2 + X_3 + 2$ and $Y_2 = 4X_1 + X_3 + 2$. Find the joint distribution of Y_1 and Y_2 .

3.(20%)

Let X be a continuous random variable with density function $f(x) = 2x^{-3}, x > 1$. Find the mean and variance of X .

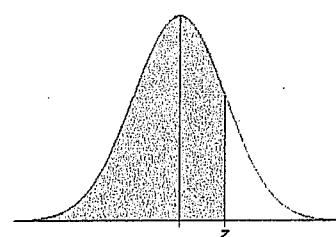
4.(20%)

Let $X_1, \dots, X_n$ be independent, with $X_i \sim N(\theta, \theta^2)$. Find the *MLE* (maximum likelihood estimator) of θ . Be sure to verify which roots of the quadratic leads to the maximum.

5.(20%)

Let $X_1, \dots, X_n$ be independent, $n \geq 2$ and $X_i \sim N(\mu, \sigma^2)$. An unbiased estimator of σ^2 is $\hat{\sigma}^2 = \frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}$, where $\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i$. Find the variance of this estimator, $\hat{\sigma}^2$; i.e. $Var(\hat{\sigma}^2)$.

Standard Normal Cumulative Probability Table



Cumulative probabilities for POSITIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

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I. Multiple Choices (45%, 3 points each, 單選題)

1. Real money demand in the economy is given by $L=0.3Y-600i$, where Y is real income and i is the nominal interest rate. In equilibrium, real money demand L equals real money supply M/P . Suppose that Y equals 2000 and the real interest rate is 5%. At what rate of inflation is seignorage maximized?
a. 42.5% b. 45.0% c. 47.5% d. 50.0%
2. According to the Ricardian equivalence proposition, current deficits
a. will not affect consumption or national saving
b. will affect consumption but not national saving
c. will affect national saving but not consumption
d. will affect both consumption and national saving
3. Vault cash is equal to \$8 million, deposits by depository institutions at the central bank are \$2 million, the monetary base is \$40 million, and bank deposits are \$100 million. The money multiplier is equal to
a. 2.5 b. 3.0 c. 4.0 d. 5.0
4. Suppose there was a banking crisis. The money supply would shrink by the greatest amount if the public ____ their currency-deposit ratio and the banks ____ their reserve-deposit ratio.
a. decreased, decreased b. decreased, increased c. increased, decreased
d. increased, increased
5. A rise in the domestic real interest rate would cause a ____ in net exports and a ____ in the exchange rate.
a. rise, rise b. rise, fall c. fall, rise d. fall, fall
6. A rapid and decisive reduction in the rate of growth of the money supply for the purpose of disinflation is called
a. a salt water policy b. a cold shower policy c. gradualism
d. a cold turkey policy

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7. One cost of a perfectly anticipated inflation is that it
- transfers wealth from lenders to borrowers
 - transfers wealth from borrowers to lenders
 - increases money costs
 - damaged the role of prices as signals in the economy
8. Lucas critique is an objection to the assumption that
- inflation is always and everywhere a monetary phenomenon
 - there is a negative relationship between inflation and unemployment
 - historical relationships between macroeconomic variables will continue to hold after new policies are in place
 - people form expectations rationally
9. In the Keynesian model, the difference between using monetary and fiscal policy to eliminate a recession is that
- monetary policy will eliminate a recession quicker than fiscal policy will
 - fiscal policy will eliminate a recession quicker than monetary policy will
 - an expansionary monetary policy will leave the economy with a lower real interest rate than an expansionary fiscal policy
 - an expansionary fiscal policy will leave the economy with a lower real interest rate than an expansionary monetary policy
10. In the long run in the Keynesian model, a beneficial supply shock would leave the economy with a higher level of output, but also a _____ real interest rate and a _____ price level.
- higher, lower
 - lower, higher
 - lower, lower
 - higher, higher
11. According to the misperceptions theory, and anticipated 10% decrease in the money supply leads to a short-run reduction in the price level of
- 0%
 - 5%
 - some amount between 0% and 10%
 - 10%
12. One important reason why the Solow residual may be strongly procyclical even if the actual technology used in production doesn't change is that
- employment is procyclical
 - resource utilization is procyclical
 - demand shocks are the dominant force determining the business cycle
 - the coefficients on capital and labor in the production function are procyclical.

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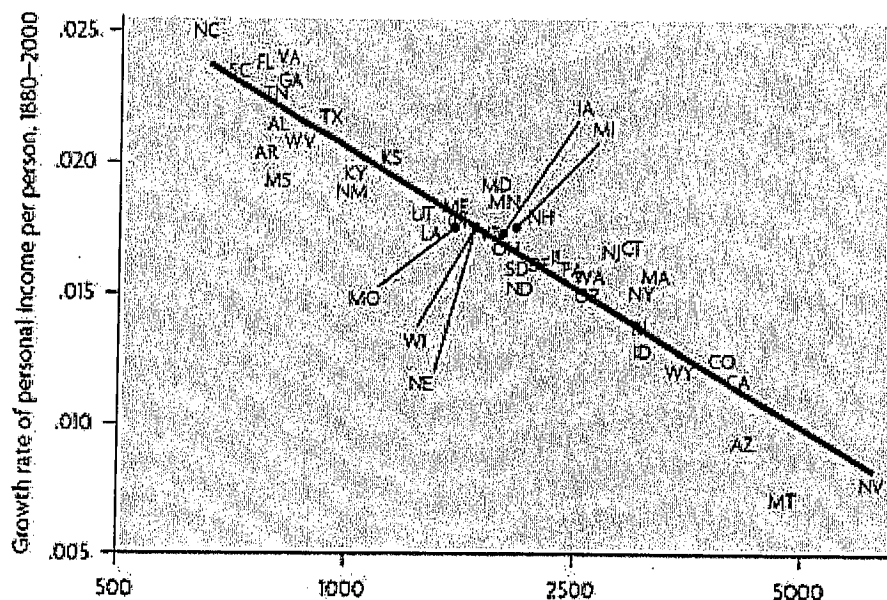
13. When RBC economists compare the correlations in their models to the data, what are they looking at?
- a. the degree to which variables lead output over the business cycle
 - b. the strength of procyclicality of different variables
 - c. the amount of random variation in economic variables
 - d. the degree to which different economic variables move together
14. Which of the following changes shifts the AD curve to the right?
- a. A rise in the nominal money supply
 - b. an increase in income taxes
 - c. an increase in the risk on nonmonetary assets
 - d. a decrease in the future marginal productivity of capital
15. When the money supply declines by 10%, in the long run, output ____ and the price level ____.
- a. is unchanged, is unchanged
 - b. declines, falls
 - c. is unchanged, falls
 - d. declines, is unchanged

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II. Problems and Calculations (55%)

1. (30%) Please apply Solow growth model to answer following questions. One of the important implications of Solow model is convergence of income across states of the US and industrial countries.



- A. (10%) According to the graph above, please interpret whether the convergence has or has not occurred between 1880 and 2000. The x-axis is income level in 1880.
- B. (10%) If Prof. White would like to test the validity of convergence, his equation is as follows.

$$\ln \left[\frac{Y}{N}_{i,2000} \right] - \ln \left[\frac{Y}{N}_{i,1880} \right] = \beta_0 + \beta_1 \ln \left[\frac{Y}{N}_{i,1880} \right] + \varepsilon_i,$$

After collecting data, the estimated equation is as follows.

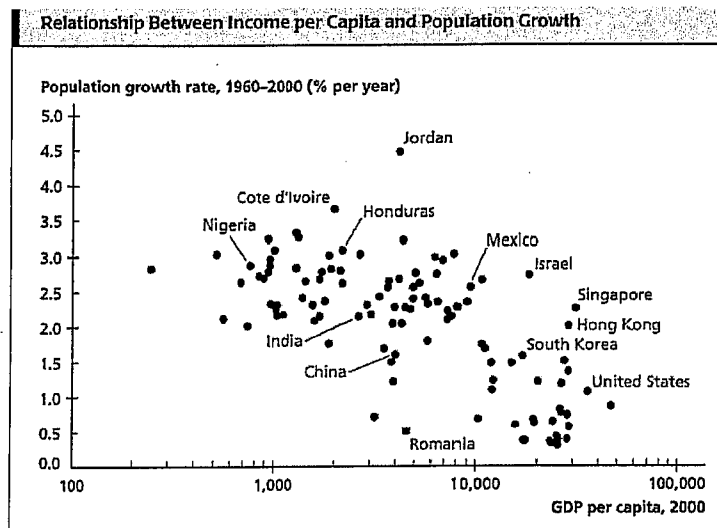
$$\ln \left[\frac{Y}{N}_{i,2000} \right] - \ln \left[\frac{Y}{N}_{i,1880} \right] = \underset{(0.15)}{0.49} - \underset{(0.65)}{2.59} \ln \left[\frac{Y}{N}_{i,1880} \right] + \varepsilon_i,$$

How do you form your testing hypothesis? Please also test your hypothesis based on 5% level of significance. Do you support that Prof. White's empirical results in finding "convergence" of Solow model?

- C. (10%) According to the following graph, it shows the relationship between growth rate of population and GDP per capita across countries.

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Please use key equation of Solow model, $\dot{k}(t) = sf(k(t)) - (n + g + \delta)k(t)$ to explain whether the implication from the graph above can be explained by the key equation.

2. (25%) The relationship between exchange rate and current account is an interesting issue to macroeconomists. Please apply the following graph to answer questions.

A. (10%) Do you find J-curve effects on the graph? Why causes J-curve effect?

B. (15%) There are both fixed exchange regime and floating exchange regime on the graph. Please graphically apply Mundell-Fleming model to analyze effectiveness of monetary policy after 1975. (Please also show the equations of Mundell-Fleming model with assumptions)

Current Account and Exchange Rate for Japan by year

