考試科目	個體經濟學 21611	所別	經濟學系	考試時間	2月28日(星期日) 第一節

1. （每小題十五分，共計三十分）

   a. 請分別利用數學以及等產量曲線圖，說明邊際成本一定是正值。

   b. 市場需求函數為 $P = 50 - Q$，其中 P 為價格而 Q 則為市場總產量。市場上共有三家廠商，各家廠商的總成本函數皆為 $C(q) = 10$，其中 q 為各家廠商的產量。假設廠商之間進行的是同時出招的價格競爭（Bertrand Competition）。試找出所有的 Nash 均衡解。

2. （二十分）假設 A 的效用函數為 $U(y,n) = [\min(2c, n)]^{0.5}$，其中 c 為消費，n 為每日休閒時間。

   a. 每日休閒時間（n）是否為正常財？

   b. A 目前的時薪為基本工資（w_1）。如果基本工資漲一倍到 $2w_1$ 時，試求此工資調整對勞動時數造成的工資效果、替代效果、以及所得效果。

3. (20 points in total)

   Assume that consumer preferences are described by a Cobb-Douglas utility function in the following form, with two goods being consumed—apples (QA) and oranges (QO):

$$U = QA^{\alpha}QO^{1-\alpha}$$

   where the parameter α is the budget share for apples, and (1-α) is the budget share for oranges.

   (a) (2 points) Derive the utility-maximizing demand functions for each commodity, for any expenditure level, Y, and for any prices of apples (PA) and oranges (PO).

   (b) (2 points) Assume that apples and oranges each account for a fifty percent budget share, expenditure in the base period is one hundred, and the initial price of apples is four and of oranges is two. Calculate the utility maximizing quantities of apples and oranges.

考試科目	個體經濟學 2161	所別	經濟學系	考試時間	2月28日(星期日) 第一節

(c) (6 points) Assume that the economic shock has caused the apple prices to fall to two but that the orange price and total expenditure remain unchanged. Solve for the new, utility-maximizing quantities of apples and oranges.

(d) (10 points) Calculate in monetary terms the impact on consumer welfare due to the abovementioned price change.

4. (30 points in total)

(a) (10 points) Set up a two-good (both are normal goods) case to illustrate the welfare change induced by a sales tax partially imposed on one of the two goods. Explain how you measure quantitatively (1) the tax payment, (2) the change in the consumer welfare in this case, and (3) the excess burden thus resulted.

(b) (15 points) Equivalent variation (EV), change in consumer surplus (ΔCS), compensating variation (CV) are broadly accepted by economists for measuring the impact on welfare due to exogenous price changes, e.g. induced by a unit tax. First, explain the concept behind these three measures of welfare change and point out the difference between them. Second, plot the uncompensated and compensated demand curves to illustrate for the abovementioned measures (whichever is applicable) in the case of a unit tax imposed on the consumption of a certain commodity. Be sure to indicate the tax payment by the consumer and the excess burden of this unit tax.

(c) (5 points) For locating the excess burden of a tax, economists tend to look at only the substitution effect, but not the income effect. Justify it.

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 105 學年度碩士班招生考試試題

考試科目	總體經濟學 21612	所別	經濟學系	考試時間	2 月 28 日(日) 第 二 節

1. 我國行政院主計處於 2014 年 11 月起，GDP 與經濟成長率的計算方式，由定基法(fixed- based)改為連鎖法(chain-lined)。假設某一國家只生產三種最終財貨：A，B，及 C。下表為這個國家在第一年、第二年及第三年的生產量(q_i)與市場價格(p_i)。 (下標i代表年度。)

	生產量			市場價格		
	q_1	q_2	q_3	p_1	p_2	p_3
A	10	11	12	10	12	12
B	12	12	12	10	15	15
C	14	15	16	10	20	22

請回答下列問題：[小數四捨五入，取至第一位。]

(a) 請以定基法(fixed based)，將第一年當成基期(based year)，分別計算該國第一年到第二年，與第二年到第三年，實質 GDP 的成長率。 (4%)

(b) 請以定基法(fixed based)，將第二年當成基期(based year)，分別計算該國第一年到第二年，與第二年到第三年，實質 GDP 的成長率。 (4%)

(c) 請以連鎖法(chain-lined)，將第一年當成參考年(reference year)，分別計算各年度連鎖量指數(chained volume index)、GDP 的連鎖值(chained dollar)數列及連鎖法下第一年到第二年，與第二年到第三年的實質 GDP 成長率。(5%)

(d) 請以連鎖法(chain-lined)，將第二年當成參考年(reference year)，分別計算各年度連鎖量指數(chained volume index)、GDP 的連鎖值(chained dollar)數列及連鎖法下第一年到第二年，與第二年到第三年的實質 GDP 成長率。(5%)

(e) 請說明定基法與連鎖法下所計算的實質 GDP 成長率的差異及其優、缺點為何? (7%)

2. 某一封閉國家的總合生產函數(aggregate production function)為$Y = K^{\alpha}L^{1-\alpha}$，$0 < \alpha < 1$，其中$Y$為實質 GDP(產量)，$K$為資本總額，$L$為有工作的總人數(或稱為工人總數)。假設該國人口總數為N，平均每位工人的儲蓄率為s，資本折舊率為δ，勞動參與率為n，失業率為u。請回答下列問題：[請寫下詳細原因及計算過程，否則不記分]

(a) 給定其它參數不變之下，如果資本總額K及勞動參與率n都增加 2%，請問實質 GDP 會改變多百分比? (3%) 同樣地，平均每位工人 GDP 會改變多百分比? (3%)

(b) 假設該國N，s，δ，n，u皆不變之下，請依 Solow 的經濟成長模型，算出穩定狀態(steady state)下，該國平均每位工人的資本量、平均每位工人的實質 GDP、每人平均資本量及每人平均實質 GDP。又當其他條件不變時，若該國因人口老化而使得勞動參與率n下降，則穩定狀態(steady state)下，該國平均每位工人的資本量、平均每位工人的實質 GDP、每人平均資本量及每人平均實質 GDP 會如何變動? (12%)

(c) 根據上述 Solow 模型，長期穩定狀態下，每人平均實質 GDP 不會改變。請以經濟直覺說明，為何長期穩定狀態下，經濟成長率為零。又如果$\alpha = 1$，長期穩定狀態下的經濟成長率會有何不同? (7%)

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	總體經濟學 21612	所別	經濟學系	考試時間	2 月 28 日(日) 第 二 節

3. (10%) Please answer the following questions:

a. (5%) Explain the natural rate of unemployment

b. (5%) Explain the "paradox of thrift" with the Keynesian Cross diagram.

4. (20%) Please answer the following questions:

a. (5%) For past two decades, the central bank of most countries implements the interest rate rule, in contrast to the control of monetary aggregate previously. Is it likely for the central bank to control the monetary aggregate and interest rate simultaneously? Please explain with diagram.

b. (5%) If the investment is unresponsive to the interest rate movement, please explain the effects of monetary policy and fiscal policy with a IS-LM diagram.

c. (10%) Please explain the difference between the classical view and Keynesian view of monetary policy.

5. (20%)

a. (10%) In a model with nominal rigidity, what are the short-run and long-run effects of a permanent increase in money supply? Does the exchange rate overshoot in the short run? Please explain with a diagram.

b. (10%) The quantitative easing policy that the advanced economies implemented in past years has led to the significant foreign fund inflows to emerging economies. How the significant rise in the foreign funds inflow may affect the exchange rate of the currency? If the central bank of emerging economies intervenes in the foreign exchange market to stabilize the exchange rate movement, how it may affect the foreign reserve and money supply of the country if it is not sterilized? Please explain with a diagram.

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　105　學年度碩士班招生考試試題

考試科目	統計學 21613	所別	經濟學系	考試時間	2 月 28 日(日) 第 三 節

注意事項:

(1) 請依題號順序作答。

(2) 不可使用計算機。

(3) 答題若過程錯誤 (或沒有過程) 但答案正確, 將以「零分」計算。

1. (25%) The joint probability density function (pdf) of X and Y is given by

$$f_{X,Y}(x,y) = \frac{e^{-Q/2}}{2\pi\sigma_x\sigma_y\sqrt{1-\rho^2}}, \quad -\infty < x < \infty, -\infty < y < \infty,$$

where

$$Q = \frac{1}{1-\rho^2}\left[\frac{(x-\mu_x)^2}{\sigma_x^2} - 2\rho\frac{(x-\mu_x)(y-\mu_y)}{\sigma_x\sigma_y} + \frac{(y-\mu_y)^2}{\sigma_y^2}\right],$$

$$\mu_x = \mathbf{E}[X],\ \mu_y = \mathbf{E}[Y],\ \sigma_x^2 = \mathrm{Var}(X),\ \sigma_y^2 = \mathrm{Var}(Y),\ \rho = \frac{\mathrm{Cov}(X,Y)}{\sigma_x\sigma_y}.$$

(1) (5%) If someone claims that above random variables X and Y **independent** when $\rho = 0$. Is she/he wrong? (You should clearly write down the reason.)

(2) If $\mu_x = 22.7, \sigma_x^2 = 17.64, \mu_y = 22.7, \sigma_y^2 = 12.25, \rho = 0.78$.

a. (5%) Find $\mathbf{E}[Y|X = x]$.

b. (5%) Find $\mathbb{P}(18.5 < Y < 22.5|X = 25)$.

(3) (10%) Assume that $\sigma_x^2 = 100$ and μ_x is unknown. If we are going to test H_o : $\mu = 60$ against $H_1 : \mu > 60$ with a observed sample mean $\bar{x} = 62.75$ based on 52 observations. What is the associated $p-$value? And what is your decision?

2. (15%) A random sample of size n is taken from a population with the probability density function (pdf):

$$f_X(x) = \frac{1}{\theta}x^{(1-\theta)/\theta}, \quad 0 < x < 1,\ 0 < \theta < \infty$$

(1) (5%) Find the **method of moments estimator** for θ, $\widehat{\theta}_{mm}$ say.

(2) (5%) Find the **maximum likelihood estimator** for θ, $\widehat{\theta}_{mle}$ say.

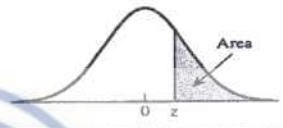
(3) (5%) Is $\widehat{\theta}_{mle}$ an unbiased estimator for θ? (You should clearly write down the details for your answer.)

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 21613	所別	經濟學系	考試時間	2 月 28 日(日) 第 三 節

3. (10%) Let X have the cumulative distribution function (cdf) $F_X(x)$ of the continuous type that is **strictly increasing** on the support $a < x < b$. Define the new transformed random variable, Y, as $Y = F_X(X)$. What is the distribution of Y?

Normal Curve Areas
Standard normal probability in right-hand tail
(for negative values of *z*, areas are found by symmetry)



	Second decimal place of z								
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0722	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0352	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
2.9	.0019	.0018	.0017	.0017	.0016	.0016	.0015	.0015	.0014	.0014
3.0	.00135									
3.5	.000 233									
4.0	.000 031 7									
4.5	.000 003 40									
5.0	.000 000 287									

From R. E. Walpole, *Introduction to Statistics* (New York: Macmillan, 1968).

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 21613	所別	經濟學系	考試時間	2月28日(日)第3節

4. (30%) Consider the linear regression model

$$y_i = \beta_1 + \beta_2 x_i + \beta_3 z_i + e_i$$

with the nine observations on y_i, x_i and z_i given as follows

$$y = (1, 2, 3, -1, 0, -1, 2, 1, 2),$$

$$x = (0, 1, 2, -2, 1, -2, 0, -1, 1),$$

$$z = (1, -2, 1, 0, -1, -1, 1, 1, 0).$$

Please answer the following questions.

(a) Find the least square estimates of β_2 and β_3.

(b) Find the standard error for the least square estimator of β_2.

(c) Compute R^2.

(d) Find the value of the F-statistic for testing $H_0 : \beta_2 = \beta_3 = 0$.

(e) Find the value of the t-ratio statistic (t-value) for testing $H_0 : \beta_2 = 1$.

5. (20%) Consider a simple linear regression model

$$y_i = \alpha_1 + \alpha_2 x_i + e_i$$

where the e_i are independent errors with $E(e_i) = 0$ and $var(e_i) = \sigma^2 x_i^2$. Suppose that we have the following five observations

$$y = (4, 3, 1, 0, 2), \quad x = (2, 1, 1, 1, 2).$$

Please find the generalized least square estimates of α_1 and α_2.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。