第一部分(個體經濟學): 填空題共 50 分，每格 5 分，答案**全對才給分**。
說明：只要填入最後的完整答案，**"請勿"寫出計算過程**。例如：你的第一個空格答案若為
"k+b"，答案請填寫 **(1) k+b**，不要列出計算過程。答案若有小數點，請四捨五入計算到小數點第
2 位。個體經濟學填空題的答案卷請製作如下：

(1)	(2)	(3)
(4)	(5)	(6)
(7)	(8)	(9)
(10)		

填空題(個體經濟學)：共 10 格，每一個空格 5 分，共計 50 分。

1. Suppose that the demand and supply functions are given by : $Q^d = 20 - 2p$ and $Q^s = -12 + 6p$, and that a
\$ 1 per unit specific tax is levied on the supply side. Determine the consumer's tax share __(1)__ , and
supply elasticity (point elasticity) __(2)__ .

2. Assume Chen's utility function is given by $U(c_1, c_2) = c_1^{0.5} + 2 c_2^{0.5}$, where c_1 is his consumption in
period 1 (current period) and c_2 is in period 2 (future period). He will earn 100 units of the consumption
goods in period 1 and period 2. He can borrow or lend in the market at an interest rate of 10%.
(a) If Chen is neither borrower nor lender, what will be his marginal rate of substitution between current
and future consumptions? __(3)__
(b) If Chen finds his optimal amount of borrowing or saving, what will be optimal ratio of c_2 to c_1 (i.e.,
$c_2^*/c_1^* = $ __(4)__)?

3. Assume the demand function of a monopolist is given by $D(P) = 60 - \dfrac{P}{2}$. It owns two factories, and
the function of total cost is assumed by $C_1 = 2q_1^2$ and $C_2 = q_2^2$ respectively, where q_1 is the output of
factory 1 and q_2 is the output of factory 2. Find the optimal output level of $q_1^* = $ __(5)__ and q_2^*
$= $ __(6)__ .

4. With an individual's consumption choices in two years given below, over what range of quantities of
X_2 consumes in current year would you conclude that the individual's behavior is **inconsistent** with the
weak axiom of revealed preference?
(≤ ? ≤) __(7)__ .

	x^0	p^0	x^1	p^1
X_1	100	10	120	10
X_2	100	10	?	8

5. Suppose that the long-run total cost for a typical mushroom producer is given by $C(y, w) = wy^2 - 10y + 100$, where y denotes the firm's output and w the wage rate. The industry total output for mushroom is
given by $Y = -1{,}000p + 40{,}000$, where Y is summation of outputs from all mushroom firms in the
mushroom industry and p is the equilibrium price in the mushroom industry.
(a) If the wage rate w is \$ 1, what will be the long-run equilibrium output level (i.e., $y^* = $ __(8)__) for
the typical mushroom picker?

(b) Assuming that the mushroom industry exhibits constant costs and that all firms are identical, what
will be the industry equilibrium price of mushrooms in long-run (i.e., $p^* = $ __(9)__), and how many
mushroom firms will there be __(10)__ ?

背面有題

第二部分: 總體經濟

選擇: 單選 (共八題，每題三分)

1. 政府實質財政赤字為 G－T＋rB，其中 G 為政府實質支出，T 為實質稅收，B 為政府實質負債餘額，r 為實質利率，若 政府實質負債餘額/實質 GDP 比率維持不變 (steady state)，則下列何者錯誤? A) 政府須維持財政收支平衡 B) 其他條件不變之下經濟成長率越高則能容許越大財政赤字 C) 其他條件不變之下政府實質負債越小則能容許越大財政赤字 D) 其他條件不變之下實質利率越低則能容許越大財政赤字

2. 依支出面法，Y=C+I+G+X-M，下列何者錯誤? A) C 包括進口消費品 B) I 包括進口設備 C) G 包括政府向國外採購 D) C, I, G 皆不包括向國外採購部分

3. 在採浮動匯率的開放經濟 AS-AD 模型中，若一般 IS-LM-BP 模型構成負斜率總需求線，則當總供給線左移導致物價上升，若不考慮實質餘額效果，下列何者不正確? A) 投資支出下降 B) 貨幣升值使出口減少 C) 實質貨幣供給減少使總需求線左移 D) 所得降低使誘發性消費減少

4. 若某甲工作收入不變，但其股票或房產增值，依凱因斯消費函數的定義，某甲 A) 儲蓄減少 B) 儲蓄增加 C) 誘發性消費增加 D) 自發性消費減少 E) 誘發性消費減少

5. 若有意外的物價上漲, 則依新興古典學派 A) 有正斜率 phillips curve B) 有負斜率 phillips curve C) 有垂直 phillips curve D) 有水平 phillips curve

6. 在一般 IS-LM-BP 模型中，下列何者最終均衡的貨幣供給會較原始均衡為少？A)在固定匯率制下緊縮貨幣 B)在浮動匯率制下緊縮財政 C)資本移動自由，在固定匯率制下緊縮財政 D)資本移動不自由，在固定匯率制下緊縮財政 E)在固定匯率下擴張貨幣

7. 欲求財政政策有效，宜 A) 投資需求受利率影響很小而貨幣需求則受利率影響很大 B) 投資需求受利率影響很大而貨幣需求則受利率影響很小 C) 投資需求與貨幣需求受利率影響都很小 D) 投資需求與貨幣需求受利率影響都很大

8. 若一國國際收支出現順差，金融帳也是順差，資本帳餘額為零，則我們可以做出何推論？A) 經常帳逆差 B) 經常帳順差 C) 該國外匯存底增加 D) 該國貨幣升值 E) 該國貨幣貶值

填空: (共五題，第一題六分，其餘每題五分)

1. 美國近年來 QE 主要是購買長期債券還是短期債券?_____(限四字之內)，為何?_____(限十字之內)

2. 日本安倍首相主張採取擴張型貨幣政策，短期中已使日幣貶值，股市上揚，及經濟復甦。依經濟理論，在何種條件之下此政策才能發生此種效果?_____(限十字之內)

3. 最近中國經濟成長有趨緩現象，全球哪一類國家經濟受創最嚴重?_____(限十字之內)

4. 不含希臘的歐元區中，過去三年失業最嚴重的國家是 _____(限三字之內)

5. 在美國、英國、日本、中國、義大利、德國、台灣等國家中，在過去兩三年中哪一國 政府名目負債/名目 GDP 比率最高？_____(限三字之內)

題目結束

以下全部為單選題，共有 20 題，每題 5 分，總分為 100 分。

1. Firm A is planning to acquire Firm B. According to empirical evidence, if Firm A prefers to make a cash offer for the merger, it generally indicates that:
    (1) Firm A's managers are optimistic about the post-merger value of A
    (2) Firm A's managers are pessimistic about the post-merger value of A
    (3) Firm A's managers are neutral about the post-merger value of A
    (4) None of the above .

2. Suppose a U.S. firm buys $200,000 worth of television tubes from a Mexican manufacturer for delivery in 60 days with payment to be made in 90 days (30 days after the goods are received). The payment obligation is determined as of now and is in terms of Mexican pesos. The rising U.S. deficit has caused the US dollar to depreciate against the peso recently. The current exchange rate is 5.50 pesos per U.S. dollar. The 90-day forward rate is 5.45 pesos/dollar. The firm goes into the forward market today and buys enough Mexican pesos at the 90-day forward rate to completely cover its trade obligation. Assume the spot rate in 90 days is 5.30 Mexican pesos per U.S. dollar. How much in U.S. dollars did the firm save by eliminating its foreign exchange currency risk with its forward market hedge? (1) about $1,800 (2) about $7,500 (3) $0 (4) about $5,500 (5) about $4,500 (6) about $3,000.

3. Which of the following statements is most correct?
    (1). An option's value is determined by its exercise value, which is the market price of the stock less its striking price. Thus, an option can't sell for more than its exercise value.
    (2). As stock price rises, the premium portion of an option on a stock increases because the difference between the price of the stock and the fixed striking price increases.
    (3). Issuing options provides companies with a low cost method of raising capital.
    (4). The market value of an option depends in part on the option's time to maturity and on the variability of the underlying stock's price.
    (5). The potential loss on an option decreases as the option sells at higher and higher prices because the profit margin gets bigger.

4. Which of the following statements is most correct?
    (1). The weighted average cost of capital for a given capital budget level is a weighted average of the marginal cost of each relevant capital component which makes up the firm's target capital structure.
    (2). The weighted average cost of capital is calculated on a before-tax basis.
    (3). An increase in the risk-free rate is likely to increase the marginal costs of both debt and equity financing.
    (4). Answers (1) and (3) are correct.
    (5). All of the answers above are correct.

5. If you believe in the reversal effect, you should
    (1). sell bonds in this period if you held stocks in the last period.
    (2). sell stocks in this period if you held bonds in the last period.
    (3). sell stocks [in this period] that performed poorly in the last period.
    (4). Buy ETF [in this period] when the stock market performed well.
    (5). sell stocks [in this period] that performed well in the last period.

6. Trumble is considering a merger with Krieble. Krieble's beta is 0.9 and it is currently financed at a debt level of 20%, at an interest rate of 8%. Krieble faces a 25% tax rate. If Trumble acquires Krieble, Krieble will increase the debt level to 60%, at an interest rate of 9 percent, and the tax rate will increase to 35%. The risk free rate is 6% and the market risk premium is 4%. What will Krieble's equity required rate of return be after it is acquired? (1). 7.4% (2). 8.9% (3). 9.3% (4). 9.6% (5). 9.7%

背面有題

7. Which of the following statements is most correct?
   (1). A firm acquiring another firm in a horizontal merger will not have its required rate of return affected because the two firms will have similar betas.
   (2). Financial theory says that the choice of how to pay for a merger is really irrelevant because, although it may affect the firm's capital structure, it will not affect the firm's overall required rate of return.
   (3). The basic rationale for any financial merger is synergy and thus, development of pro-forma cash flows is the single most important part of the analysis.
   (4). In most mergers, the benefits of synergy and the price premium the acquirer pays over market price are summed and then divided equally between the shareholders of the acquiring and target firms.
   (5). The primary rationale for any operating merger is synergy, but it is also possible that mergers can include aspects of both operating and financial mergers.

8. Stock index now is = 8000. Risk-free rate= 3% a year. Cash dividend yield=1%. When you trade stock index futures, initial margin is10% of the value of futures. Multiplier=2. Your deposit earns risk-free rate. Your own capital=$8,000. You decide to buy 2 contracts of index futures. After paying the deposit, you invest the remaining fund in government bonds. The Beta of your investment position is within the range of : (1)0~ 1 (2)1.1~2 (3)2.1~3 (4)3.1~4 (5) higher than 4.

9. John would like to short-sell IBM stock (beta=1.2) because of risk management concern. However, IBM common shares are unavailable to borrow for the purpose of short-sale. As a substitute, which of following stocks should John short-sell instead ? (1) a stock which is in the same industry and of the same size (2) a stock whose correlation coefficient with IBM stock is 1 and has a beta of 0.8 (3) a stock whose correlation coefficient with IBM stock is 0.9 and has a beta of 0.9 (4) a stock whose correlation coefficient with IBM stock is 0.8 and has a beta of 1 (5) a stock whose correlation coefficient with IBM stock is 0.8 and has a beta of 1.2 (6) All of the above have the same effect.

10. Health and Wealth Company is financed entirely by common stock that is priced to offer a 15% expected return. If the company repurchases 25% of the common stock and substitutes an equal value of debt yielding 6%, what is the expected return on the common stock after refinancing? (Ignore taxes.) (1) 18% (2) 21% (3) 15% (4) None of the above

11. Learn and Earn Company is financed entirely by common stock that is priced to offer a 20% expected rate of return. The stock price is $60 and the earnings per share are $12. The company wishes to repurchases 50% of the stock and substitutes an equal value of debt yielding 8%. Suppose that before refinancing, an investor owned 100 shares of Learn and Earn common stock. What should he do if he wishes to ensure that risk and expected return on his investment are unaffected by refinancing? (1) Borrow $3,000 and buy 50 more shares (2) Continue to hold 100 shares (3) Sell 50 shares and purchase $3,000 debt (bonds) (4) None of the above.

12. Before merger announcement, number of common shares: Company A: 2000. Company B: 1000. Earnings per share: A: $10. B: $10. Share price: A: $100. B: $50. Company A would like to acquire B by offering one share of A for every two shares of B. If investors are aware that there is no synergy from the merger, the price-earnings ratio of A's stock after the merger is : (1) lower than 5 (2) 5.01~6 (3) 6.01~7 (4) 7.01~8 (5) 8.01~9 (6) 9.01~10 (7) higher than 10.

13. On Jan. 1, 匯率 USD: JPY= 1:100, USD 一年期 Risk-free rate= 5%. JPY 一年期 Risk-free rate=1%. 一年後 USD:JPY= 1: X, 實證上 X 的值 (1) = 100×1.05/1.01 (2) = 100×1.01/1.05 (3)大於 1.05/1.01 (4)小於 1.05/1.01 (5)大於 1.01/1.05 (6)小於 1.01/1.05

14. 股票甲現在股價為 60 元，一年後股價有 2 個可能：(1)80 元 if 景氣好（機率為 70%）或 (2)50 元 if 景氣壞（機率為 30%），Risk-free rate=10%. 有一買權（標的物為甲，履約價\$70，一年後到期），另外，Security X 的一年後 payoff 有兩個可能(1) \$1 if 景氣好（機率為 70%），(2) \$ 0 if 景氣壞. Security X 現在價格= a1. Security Y 的一年後 payoff 有兩個可能(1) \$0 if 景氣好（機率為 70%），(2) \$1 if 景氣壞, Security Y 現在價格= a2，請問 a1= (1) lower than 0.3 (2) 0.31~0.35 (3)0.36~0.4 (4)0.41~0.45 (5)0.46~0.5 (6)0.51~0.6 (7) 0.61~0.65 (8) 0.66~0.7 (9) higher than 0.71

15. 請問上一題的 a2= (1) lower than 0.3 (2) 0.31~0.35 (3)0.36~0.4 (4)0.41~0.45 (5)0.46~0.5 (6)0.51~0.6 (7) 0.61~0.65 (8) 0.66~0.7 (9) higher than 0.71

16. If the 2-year forward rate of interest is the same as the 1-year spot rate, what is the 2-year spot rate? [All the rates here are annualized rates.]
    (1) Smaller than the 1-year spot rate
    (2) Larger than the 1-year spot rate
    (3) Can't say without knowing the 3-year spot rate
    (4) The same as the 2-year forward rate

17. Old Quartz Gold Mining Company is expected to pay a dividend of \$8 in the coming year. Dividends are expected to decline at the rate of 2% per year. The risk-free rate of return is 6% and the expected return on the market portfolio is 14%. The stock of Old Quartz Gold Mining has a beta of -0.25. The intrinsic value of the stock is: (1) lower than 100 (2) 101~110 (3)111~120 (4)121~130 (5)131~140 (6) 141~150 (7)151~160 (8) higher than 161.

18. Arbitrage proofs in futures market pricing relationships
    (1). rely on the CAPM. (2). demonstrate how investors can exploit mispricing. (3). incorporate transactions costs. (4). All of these are correct. (5). None of these is correct.

19. Portfolio A consists of 150 shares of stock and 300 calls on that stock. Portfolio B consists of 575 shares of stock. The call delta is 0.7. Which portfolio has a higher dollar exposure to a change in stock price? (1) Portfolio B. (2) Portfolio A. (3) The two portfolios have the same exposure. (4) A if the stock price increases and B if it decreases. (5) B if the stock price decreases and A if it increases.

20. To exploit an expected increase in interest rates, an investor would most likely
    (1) sell government bond futures. (2) take a long position in commodity futures. (3) buy S&P 500 index futures. (4) take a long position in government bond futures. (5) None of these is correct.

注意事項：

(A) 請在答案卷『<u>非選擇題作答區</u>』作答，<u>需寫明格號</u>並直接填寫答案即可，請勿在答案卷上寫計算過程。請依格號順序作答，勿跳題或跳格作答。特別注意：在『選擇題作答區』作答者，一律不給分。

(B) 如果你的答案與自然對數或自然指數有關，不需要化為小數，直接以自然對數或自然指數之函數表示即可。如果算到小數點以下第四位尚未除盡，請四捨五入至小數點以下第三位；如果算到小數點以下第四位已經除盡，不需要四捨五入至小數點以下第三位。

(C) 配分方式：除了第(31)、(32)格每格 5 分，其餘每格 3 分。

第一部份：每格 3 分

1. 財務領域經常用到許多統計觀念，請回答以下問題：

- 在資本資產定價理論中提到某資產 i 的預期報酬率 $E(R_i) = r_f + \beta_i \times [E(R_M) - r_f]$，其中 r_f 為已知之無風險報酬率，$E(R_M)$ 為市場投資組合預期報酬率。若要依據歷史資料估計 beta 值，假設迴歸模型 $R_i = r_f + \beta_i \times [R_M - r_f] + \varepsilon_i$，其中 ε_i 為誤差項，使用最小平方法(OLS)估計 β_i 時，採用___(1)___(請填寫「無截距」或「有截距」)之迴歸模型較佳。此外，某投資者想了解資產 i 的系統風險是否顯著比市場投資組合的系統風險高，可以設定虛無假設為___(2)___並進行假設檢定。

- 在評價美式賣權(American-style put)時，常用二元樹模型評價。假設標的物為股票，賣權到期日為 T，由今日至到期日分割為 n 個等長的小區間，二元樹模型假設標的物價格在每個小區間皆為___(3)___分配。

- 壽險公司承保人數愈多，則損失估計值愈接近母體損失期望值，而且損失估計值的波動程度愈小，此為統計學___(4)___之應用。

2. 某一金融集團想了解 A、B、C 三個國家當地證券分析師對於 2014 年世界經濟的展望，在這三個國家分別針對 100 名當地分析師進行問卷調查，得到表一的結果。

- 若只考慮 A 國，給定顯著水準為 0.05，則 margin of error 為___(5)___。

- 現在考慮 A、B、C 三國。虛無假設 H0：A、B、C 三國分析師認為 2014 年景氣持續復甦的比例相同；對立假設 H1：A、B、C 三國分析師認為 2014 年景氣持續復甦的比例不同。此檢定為___(6)___(請填寫「雙尾」或「右尾」或「左尾」)檢定。研究者可得到檢定統計量之值為___(7)___，可以查___(8)___分配的統計附表進行推論(第(8)格請完整寫出其參數，全對才給分)，並且可繪出該分配的機率密度函數概略圖形為___(9)___(第(9)格請詳細註明橫軸縱軸的意義，全對才給分)。

表一：問卷調查抽樣結果

問題：您是否認為 2014 年景氣持續復甦？			
	抽樣人數	答「是」的人數	答「否」的人數
A 國	100	90	10
B 國	100	70	30
C 國	100	50	50

背面有題

3. 研究者想了解 A、B、C 三檔股票的報酬率是否有顯著差異，分別收集這三檔股票在過去 250 個營業日的股價資料，並且計算每日報酬率，將每日報酬率乘以 100 後進行分析(例如：若算得某日報酬率為 0.053 或 5.3%，則以 5.3 作為樣本值)。設定虛無假設 H0：三檔股票報酬率相同；對立假設 H1：三檔股票報酬率不全相同，進行單因子變異數分析，部份結果如表二。請問：

- 在進行單因子變異數分析時，通常針對母體假設___(10)___(第(10)格全對才給分)。
- 在表二標示■的位置(即 mean square due to treatments)，數字為___(11)___；標示◇的位置(即 F 值)，數字為___(12)___。
- 研究者可查 F 分配表，給定顯著水準為 0.05，使用 F 分配之特性，得到___(13)___(請填寫「不拒絕」或「拒絕」或「現有資訊無法判斷」)虛無假設為真之結論。
- 此外，若研究者直接以每日報酬率進行分析，而未如上述流程將每日報酬率乘以 100 後分析，則 total sum of squares 應該為___(14)___。

表二：ANOVA 表

	SS	df	MS	F
Treatment	19	??	■	◇
Error	8710	??	??	
Total	??	??		

4. X 與 Y 皆為連續型隨機變數，其聯合機率密度函數如下：

$$f(x,y) = \begin{cases} ke^{-5x-4y} & if \quad x>0, y>0 \\ 0 & otherwise \end{cases}$$

- 常數 k 應等於___(15)___，才能使 $f(x,y)$ 為良好定義之聯合機率密度函數。
- 請問 X 與 Y 這兩個隨機變數是否為獨立且同態(independent and identical)？為什麼？___(16)___(第(16)格全對才給分)。
- 期望值 $E(X+Y)=$___(17)___；$E(e^{3X+2Y})=$___(18)___。
- 機率值 $P(X>1$ 且 $Y>2)=$___(19)___。

5. 考慮迴歸模型 $Y_i = \beta x_i + \varepsilon_i$，其中 $\varepsilon_i \sim ND(0, \sigma_\varepsilon^2)$，$\sigma_\varepsilon^2$、$\beta$ 皆為待估計參數。研究者抽取一組樣本數為 100 的成對樣本，得到以下數據：

$$\bar{x} = \sum_{i=1}^{100} x_i/100 = 5.2, \quad \bar{y} = \sum_{i=1}^{100} y_i/100 = 4.6, \quad \sum_{i=1}^{100} x_i^2 = 3182, \quad \sum_{i=1}^{100} y_i^2 = 2500$$

$$\sum_{i=1}^{100}(x_i - \bar{x})^2 = 478, \quad \sum_{i=1}^{100}(y_i - \bar{y})^2 = 384, \quad \sum_{i=1}^{100} x_i y_i = 2398$$

- 以最大概似法估計未知參數，可得到 β 的估計值為___(20)___。
- 承上，可進一步得到殘差項平方和為___(21)___，σ_ε^2 的估計值為___(22)___。
- 若要檢定虛無假設 H0：$\beta = 0$；對立假設 H1：$\beta \neq 0$，可以查自由度為___(23)___的 t 分配表。

背面有題

6. 假設隨機樣本 $X_1, X_2, ..., X_n$ 服從卜瓦松分配，機率質點函數為

$$f(x) = \begin{cases} \dfrac{\lambda^x e^{-\lambda}}{x!} & if \qquad x = 0,1,2,3,... \\ 0 & otherwise \end{cases}$$

● 令 $Y = \sum_{i=1}^{n} X_i$，可推導得到機率值 $P(Y \leq 1)$ 為___(24)___。

● 假設研究者抽樣得到以下樣本值：

8	3	7	7	8
4	9	7	5	2

　　註：本表用於回答第(25)格；
　　　　10 個樣本值的樣本平均數為 6，樣本標準差為 2.357，
　　　　樣本平方和為 410。

以最大概似法估計未知參數 λ，可得到 λ 之估計值為___(25)___。

7. 假設研究者抽樣得到以下樣本值：

2.16	4.30	5.26	2.03	1.27
3.25	6.25	5.11	1.66	4.52

　　註：本表用於回答第(26)格與第(27)格；
　　　　10 個樣本值的樣本平均數為 3.581，樣本標準差為 1.740，
　　　　樣本平方和為 155.4801。

● 若此樣本來自均勻分配之母體，此母體的機率密度函數為

$$f(x) = \begin{cases} \dfrac{1}{b-a} & if \qquad a \leq x \leq b \\ 0 & otherwise \end{cases}$$ 。以最大概似法估計未知參數 a 與 b，可得到 $\dfrac{a+b}{2}$

之估計值為___(26)___。

● 若此樣本來自兩參數指數分配之母體，此母體的機率密度函數為

$$f(x) = \begin{cases} 2e^{-2(x-\eta)} & if \qquad x \geq \eta \\ 0 & otherwise \end{cases}$$ 。以最大概似法估計未知參數 η，可得到 η 之估計值

為___(27)___。

背面有題

8. 研究者想了解臺灣的上市公司「股價表現或營業績效」與「公司特性或他國經濟表現」之間的關係，設計迴歸模型。

- 考慮特定 N 公司，研究者想了解 N 公司股價表現與加拿大 S&P TSX 綜合指數表現之間的關係，令 $Y_t = \beta_0 + \beta_1 \cdot TSX_{t-1} + \varepsilon_t$，其中 ε_t 為誤差項，Y_t 為 102 年臺灣當地第 t 個營業日之 N 公司收盤價，TSX_{t-1} 為同一年度臺灣當地第 t 個營業日前一日的加拿大 S&P TSX 綜合指數收盤價，若前一日加拿大休市，則往前取最接近第 t 個營業日的加拿大 S&P TSX 綜合指數收盤價。已知 N 公司在 102 年並無除權除息，亦無現金增資或減資。研究者得到判定係數 R^2 很接近 1，而且 β_1 顯著異於 0，此資訊以及資料型態反應出此迴歸模型可能有什麼缺失？　　(28)　　。(第(28)格請由迴歸模型的缺失來作答，答案請在一列內完成。)

- 考慮臺灣的所有上市公司，令 $Y_i = \beta_0 + \beta_1 \cdot TA_i + \beta_2 \cdot TL_i + \beta_3 \cdot TE_i + \varepsilon_i$，其中 ε_i 為誤差項，Y_i 為公司 i 於 102 年全年度的股價報酬率(已考慮除權除息影響)，TA_i、TL_i、TE_i 分別為公司 i 於 101 年年底資產負債表上記載的資產總值、負債總值、股東權益總值，請問此迴歸模型有什麼缺失？　　(29)　　。(第(29)格請由迴歸模型的缺失來作答，答案請在十個中文字內完成，超過十個中文字者視為全錯。)

- 考慮臺灣的所有上市公司，令 Y_i 為二元變數，若公司 i 於 102 年全年度的 ROA_i 為正數，則令 $Y_i = 1$，否則令 $Y_i = 0$。設計迴歸模型 $Y_i = \beta_0 + \beta_1 \cdot Sale_i + \varepsilon_i$，其中 ε_i 為誤差項，期望值 $E(\varepsilon_i) = 0$，$Sale_i$ 為公司 i 於 102 年全年度的銷貨收入。若使用最小平方法 (OLS)來估計 β_0 與 β_1 並且預測 Y_i，在預測 Y_i 時會有什麼潛在缺失？　　(30)　　。(第(30)格請由迴歸模型在預測 Y_i 時的缺失作答，答案請在兩列內完成。)

第二部份：每格 5 分

9. 二元離散隨機變數(X, Y)之聯合機率質點函數如下：

$$P(x,y) = \begin{cases} \dfrac{10!}{x!\,y!\,(10-x-y)!} p_1^x p_2^y (1-p_1-p_2)^{10-x-y} & if \quad \begin{matrix} x = 0,1,2,\ldots,10 \quad y = 0,1,2,\ldots,10 \\ 0 \le x+y \le 10 \end{matrix} \\ \\ 0 & otherwise \end{cases}$$

- 條件期望值 $E(Y \mid X = x)$ 為　　(31)　　(請以 x、p_1 與 p_2 之函數表示)。
- 若已知 $p_1 = 0.6$ 及 $p_2 = 0.1$，則變異數 $Var_X(E(Y \mid X))$ 為　　(32)　　。