國 立 雲 林 科 技 大 學
100 學年度碩士班暨碩士在職專班招生考試試題

系所：財金系、企管系、創管學程
科目：微積分(3)

1. A real sequence $\{x_n\}$ satisfies $7x_{n+1} = x_n^3 + 6$ for $n \geq 1$.

   If $x_1 = \dfrac{1}{2}$, find its limit. (10 分)

2. The formula in the Mean-Value Theorem can be written as follow:

   $\dfrac{f(x+h) - f(x)}{h} = f'(x + \theta h)$, where $0 < \theta < 1$. Determine θ as function of x

   and h when $f(x) = x^2$. (10 分)

3. Find the volume of the region bounded by the parabolic cylinder $z = 4 - x^2$ and

   the planes $x = 0$, $y = 0$, $y = 6, z = 0$. (5 分)

4. Evaluate $\displaystyle\int_1^7 \dfrac{dx}{\sqrt[3]{x+1}}$. (5 分)

5. Let $S_n = nxe^{-nx^2}, n = 1, 2, 3, \ldots, 0 \leq x \leq 1$. Determine whether

   $$\lim_{n\to\infty} \int_0^1 S_n(x)\, dx = \int_0^1 \lim_{n\to\infty} S_n(x)\, dx.$$ (5 分)

6. For what values of x does $\displaystyle\sum_{n=1}^{\infty} \dfrac{1}{2n-1}\left(\dfrac{x+2}{x-1}\right)^n$ converge? (5 分)

7. If $y = x^x$, compute $\dfrac{dy}{dx}$. (5 分)

8. Evaluate $\displaystyle\int_0^\infty \dfrac{\sin^3 x}{x}$. (5 分)

9. Find the indefinite integral $\displaystyle\int \dfrac{e^x + e^{-x}}{2} \cos x\, dx$. (10 分)

10. Compute $\displaystyle\sum_{x=0}^{\infty} \dfrac{1}{2^x x!}$. (10 分)

11. Evaluate $\displaystyle\int_0^\infty e^{-x^2}\, dx$. (10 分)

12. Find the equation of the tangent line to the graph $y^2 - x^2 y - x^3 - 1 = 0$ at the

    point $(x_0, y_0) = (1, 2)$. (10 分)

13. Evaluate the summation $\displaystyle\sum_{n=1}^{\infty} n^2 \left(\dfrac{1}{3}\right)^n$. (10 分)

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本試題共計單選題 40 題，每題 2.5 分，請將答案依序填入答案格內，作答時不可使用計算機。

1. 春麗有 100 萬的資金想要做 3 年的定期存款。甲銀行目前牌告利率為 5%, 每年付息一次。乙銀行牌告利率為 4.95%, 每半年付息一次。丙銀行牌告利率為 4.90%, 每一季付息一次。請問丙銀行的有效年利率(EAR)為 (四捨五入至小數點後 2 位):

(A) 4.90%   (B) 4.97%   (C) 4.99%   (D) 5.01%

提示:

$(1.025)^2=1.0506, (1.0125)^4=1.0509$

$(1.02475)^2=1.0501, (1.012375)^4=1.0504$

$(1.0245)^2=1.0496, (1.01225)^4=1.0499$

2. 承上題，若春麗把錢存在 EAR 最高的一家銀行，3 年後可以領回多少錢?

(A) 1,157,625   (B) 1,157,956   (C) 1,157,294   (D) 1,158,377

3. 多樹向某銀行貸款$50,000，分 3 年償還，年利率固定為 8%，每年年底還款額相等。請問多樹每年年底需還銀行多少錢?

(A) 19,402   (B) 16,666   (C) 18,391   (D) 20,075

提示:

若利率為 8%, 三年期期末年金現值因子為 2.5771，三年期期末年金終值因子為 3.2464

4. 承上題，請問第 2 年底多樹還款後，該筆貸款剩下的的未清償餘額還有多少?

(A) 17,964   (B) 16,666   (C) 17,029   (D) 18,587

5. 保險公司業務夏美向你推銷儲蓄型意外險, 連續7年每年年初需支付保險公司20萬, 若被保險人在保險期間沒有發生意外，7 年後可一次領回 20*7=140 萬, 7 年當中若因意外身故可領回 1500 萬。另外假設目前銀行存款年利率為 3%。請問以下敘述哪些是正確的?

I. 因為 7 年後可將所繳保險費用全部領回，所以購買這張保單沒有成本。

II. 因為錢不買保險放銀行會生利息，所以買這張保單的成本就是 7 年當中因購買保單而放棄的利息。

III. 在 3%的利率下，7 期的期末年金終值因子為 7.6625，因此這張保單中所隱含的每年的意外險保費約為 1.73 萬元。

IV. 在 3%的利率下，7 期的期末年金終值因子為 7.6625，因此這張保單中所隱含的每年的意外險保費約為 2.26 萬元。

(A) 僅 I 正確   (B) 僅 II 正確   (C) 僅 II, III 正確   (D) 僅 II, IV 正確

6. 請問以下哪些可能是投資債券的實際報酬率不等於殖利率的原因?

I. 發行機構違約。

II. 尚未持有到期就賣出。

III. 投資期間當中殖利率波動。

IV. 利息的再投資報酬率不等於殖利率。

(A) 僅 I, II 正確　　　(B) 僅 I, III, IV 正確　　　(C) 僅 I, II, IV 正確　　(D)所有敘述都正確

7. 請問以下敘述哪些是正確的?

I. 投資垃圾債券雖然預期報酬率很高, 但是發行公司倒閉的機率也很大。

II. 在其他條件相同之下, 抵押債券的殖利率會低於信用債券。

III. 可轉換公司債因為對於投資者在預期公司前景看好時可以將債券換成發行公司的普通股, 因此殖利率會比其他條件相同但不能轉換的公司債高。

IV. 若公司發行可贖回債券, 在利率走高時可以將債券贖回重新發行以降低資金成本。

(A) 僅 I 正確　　　(B) 僅 I,II 正確　　　(C) 僅 I,II, III 正確　　　(D) 僅 I,II, IV 正確

8. 當利率下降時, 以下哪一種債券的價格將上漲最多?

(A) 20 年後到期, 殖利率=4%的零息公債

(B) 20 年後到期, 票面利率=5%, 殖利率=4%的公債

(C) 15 年後到期, 票面利率為 5%, 殖利率=4%的公債

(D) 15 年後到期, 票面利率為 5%的垃圾債券

9. 下面有關 5 日乖離率 (Bias) 及 5 日相對強弱指標 (RSI) 的敘述哪些是正確的

I. 若公司股票連續 5 天上漲，則 Bias>5%。

II. 若公司股票連續 5 天下跌，則 RSI=0。

III. 當 RSI<20 時, Bias 必然<-5%。

IV. 一般來說 RSI>80 為賣出訊號, Bias<-5%為買入訊號。

(A) 僅 I, IV 正確　　　(B) 僅 II, IV 正確　　　(C) 僅 III, IV 正確　　　(D) 僅 I,II, IV 正確

提示: 5 日相對強弱指標 ＝5 日收盤價上漲平均/5 日收盤變動平均*100,

5 日乖離率 ＝(當日收盤價-5 日平均收盤價)/ 5 日平均收盤價*100%

10. 下面哪些不是公司普通股股東的權利

I. 在股東大會上投票選舉公司董事的權利

II. 公司發行新股時有優先認購的權利

III. 公司獲利時有參與盈餘分配(配發股利)的權力

IV. 在公司經營不善被清算時擁有優先受償的權利

(A) 僅 IV　　　(B) 僅 II, IV　　　(C) 僅 III, IV　　　(D) 僅 I, IV

11. 旺旺公司適當的折現率 r 為 20%, 預期明年每股盈餘(EPS)=10, 其中 4 元發股利 $(D_1=4)$, 其餘 6 元用來投資新的廠房, 新投資的股東權益報酬率(ROE)=0.30。請問根據股利折現模型

(dividend discount model, DDM) 計算之公司股價爲何?

(A) 50　　(B) 188　　(C) 200　　(D) 240

12. 承上題,請問該公司的成長機會現值(present value of growth opportunity, PVGO)爲何?

(A) -150　(B) 0　　　(C) 50　　(D) 150

13. 請問下面哪些現象與市場具有半強式效率性不牴觸

I. 平均而言, 基金經理人的績效無法打敗大盤績效

II. 今天股票的報酬與昨天的股票報酬統計上的相關性接近 0

III. 公司的內部人士利用內線消息可以賺取暴利

IV. 投資人無法憑藉仔細的研究分析公司財務報表而獲利

(A) 僅 I, IV　　(B) 僅 I, III, IV　　(C) 僅 I, II, IV　　(D) I, II, III, IV 皆不牴觸

14. 股票 E 的報酬率標準差爲 20%, $\beta=2$; 股票 C 報酬率標準差爲 30%, $\beta=1.2$,兩支股票報酬率的
相關係數爲 0.9。請問下面的敘述哪些是正確的?

I. 股票 E 的總風險低於股票 C

II. 股票 E 所承擔的市場風險高於股票 C

III. 若用 1/2 的資金投資股票 E, 其餘投資股票 C, 則此投資組合預期報酬率的標準差爲 25%。

IV. 若用 1/2 的資金投資股票 E, 其餘投資股票 C, 則此投資組合的 $\beta=1.6$。

(A) 僅 I, II　　　　(B) 僅 II, IV　　　(C) 僅 I, II, IV　　(D) I, II, III, IV

15. 承上題的設定,另外假設股票 E 及股票 C 的預期報酬率皆爲 20%,無風險利率爲 5%,市
場風險溢酬爲 7%,請問下面的敘述哪些是正確的?

I. 股票 E 的夏普比率 (Sharp ratio, or Sharp index) 爲 0.75。

II. 股票 C 的崔納比率 (Treynor ratio, or Treynor index) 爲 12.5。

III. 股票 E 的 Jensen's alpha 爲 1%。

IV. 對一個目前並未持有任何風險性資產的投資人來說,應選擇投資股票 C。

(A) 僅 I　　(B) 僅 II, III　　　(C) 僅 I, II, III　　(D) I, II, III, IV

16. 請問以下關於資本資產訂價模型 (CAPM) 的敘述哪些是正確的?

I. 資產的預期報酬與該資產承擔的系統風險以及市場的風險溢酬有關, 但與該資產的個別風
險無關。

II. β 衡量的是該資產的系統風險, $\beta=2$ 代表該資產報酬因總體經濟波動而受到影響的程度大概
是大盤的 2 倍。

III. β 有可能爲 0, 但是不可能爲負值。

IV. 投資人應該優先考慮 β 較小的股票。

(A) 僅 II 正確　　　(B) 僅 I, II 正確　　(C) 僅 I, II, III 正確 (D) 僅 I, II, IV 正確

17. 市場均衡時兩支股票的資料如下，假設 CAPM 成立, 請問無風險利率 R_F 為

(A) 2.5%　(B) 5%　(C) 7.5%　(D) 10%

	股票 A	股票 B
E(R)	0.2	0.15
β	2	1

18. 請問根據資本結構的抵換理論 (trade-off theory)，以下何種狀況下公司應該多舉債?

I. 兩稅 (營利事業所得稅及綜合所得稅) 合一之後

II. 政府解除產業管制，公司競爭對手增加

III. 公司經理人自肥問題嚴重時

(A) 僅 III　　(B) 僅 I, II　　(C) 僅 I, III　　(D) I, II, III

19. 請問以下哪些是資本結構的融資順位理論 (pecking order theory) 可能成立的條件?

I. 公司管理者與股東間有代理問題。

II. 發行公司債或是新股需要支付承銷商發行費用。

III. 市場投資人對於證券評價出現系統性的高估或低估。

IV. 外部投資人不是非常清楚每家公司的資產獲利能力。

(A) 僅 I, II　　(B) 僅 I, III　　(C) 僅 II, III　　(D) 僅 II, IV

20. H 公司預計明年及後年各發放普通股股利 10 元，然後結束營業。你是 H 公司的股東，擁有 100 張公司的股票，你並不喜歡公司目前的股利政策，你希望公司明年發 12 元，後年發 7.9 元，假設公司普通股的資金成本為 5%，你該如何自製股利?

(A) 在明年除息之後賣掉 21 張股票。

(B) 在明年除息之前賣掉 21 張股票。

(C) 在明年除息之後借錢買入 21 張股票。

(D) 在明年除息之前借錢買入 21 張股票。

21. If a stock is purchased for \$25 per share and held one year, during which time a \$1.75 dividend is paid and the price climbs to \$26.75, the nominal rate of return is:

(A) 13.00%　　(B) 14.00%　　(C) 20.00%　　(D) 27.00%

22. Which component is more likely to be biased if book values are used in the calculation of WACC rather than market values?

(A) Debt　(B) Preferred stock　(C) Common stock　(D) All categories should be equally biased.

23. Which of the following statements is correct for an investor starting with \$1,000 in common stocks over a 20-year investment horizon in which stocks averaged 11% in nominal terms and 4% in real terms?　The portfolio value is now approximately:

Hint: $(1.11)^{20}=8.06231$, $(1.04)^{20}=2.19112$, $(1.055)^{40}=8.513309$, $(1.02)^{40}=2.20804$

(A) $1,800 in real terms.

(B) $3,679 in real terms.

(C) $3,870 in nominal terms.

(D) $8,062 in nominal terms.

24. Calculate the profit per share for an investor that exercises a put option with a strike price of $60 when the stock is selling for $46 and the premium for the put option was $4.

(A) ($14) (B) ($10) (C) $10 (D)$18

25. Project A has a 10 percent cost of capital and the following cash flows:

Year	Project A Cash Flow
0	-$300
1	100
2	150
3	200
4	50

What is Project A's discounted payback?

(A) 2.25 years (B) 2.36 years (C) 2.43 years (D) 2.50 years (E) 2.57 years

26. Assume that shares in A limited have a beta coefficient of 1.2. The market risk premium is 8% and the risk-free rate is 5%. What is A limited's cost of equity capital?

(A) 14.0% (B) 14.5% (C) 14.6% (D) cannot be calculated (E) 4.6%

27. WACC unadjusted is known as unadjusted because:

(A) it is not adjusted for implicit costs of debt and equity

(B) the discount rate is not the appropriate discount rate

(C) it is not adjusted for taxes

(D) the cash flows are post-tax cash flows

(E) both A and C

28. Which of the following is correct concerning terms of trade credit of 4/10, EOM, net 90?

(A) The discount period expires on the last day of the month.

(B) The invoice becomes delinquent 90 days after the last day of the month.

(C) The discount period ends on the tenth day of the month following the invoice.

(D) The discount period ends either 10 days after invoicing or at the end of the month, whichever is earlier.

29. Adams Audio is considering whether to make an investment in a new type of technology. Which of the following factors should the company consider when it decides whether to undertake the investment?

(A) The company has already spent $3 million researching the technology.

(B) The new technology will affect the cash flows produced by its other operations.

(C) If the investment is not made, then the company will be able to sell one of its laboratories for $2 million.

(D) Statements b and c should be considered.

(E) All of the statements above should be considered.

30. An inventory turnover of 3.5 times indicates that:

(A) we bought our inventory 3.5 times

(B) we sold our inventory 3.5 times

(C) we bought and sold our inventory 3.5 times

(D) we held 3.5 times our inventory

(E) both A and D

31. One way to obtain a credit commitment from a customer before the goods are delivered is to arrange a(n):

(A) sight draft

(B) commercial draft

(C) banker's acceptance

(D) conditional draft

(E) open draft

32. Suppose that your firm has a cost of equity of 18% and a cost of debt of 8%. If the target D/E is 0.60 and the tax rate is 35%, what is the firm's WACC?

(A) 13.10%   (B) 13.12%   (C) 13.20%   (D) 13.32%   (E) 13.02%

33. Corporate charter provisions allowing existing shareholders to purchase stock at some fixed price in the event of a hostile outside takeover attempt are called a:

(A) leveraged buyout

(B) poison pill

(C) share rights plan

(D) golden parachute

34. Which of the following statements is most correct?

(A) If a stock's beta increased but its growth rate remained the same, then the new equilibrium price of the stock will be higher (assuming dividends continue to grow at the constant growth rate).

(B) Market efficiency says that the actual realized returns on all stocks will be equal to the expected rates of return.

(C) An implication of the semistrong form of the efficient markets hypothesis is that you cannot consistently benefit from trading on information reported in *The Wall Street Journal*.

(D) Statements a and b are correct.

(E) All of the statements above are correct.

35. The value of a firm is maximized when:

(A) the WACC remains the same

(B) the WACC increases

(C) the WACC is minimised

(D) WACC has no bearing on the value of the firm

(E) WACC is minimised but the discount rate increases

36. Daniel is expected to pay a $1.00 per-share dividend at the end of the year ($D_1 = \$1.00$). The stock sells for $20 per share and its required rate of return is 11 percent. The dividend is expected to grow at a constant rate, g, forever. What is the growth rate, g, for this stock?

(A) 5%　　(B) 6%　　(C) 7%　　(D) 8%　　(E) 9%

37. Which of the following statements is most correct?

(A) If a stock's beta increased but its growth rate remained the same, then the new equilibrium price of the stock will be higher (assuming dividends continue to grow at the constant growth rate).

(B) Market efficiency says that the actual realized returns on all stocks will be equal to the expected rates of return.

(C) An implication of the semistrong form of the efficient markets hypothesis is that you cannot consistently benefit from trading on information reported in *The Wall Street Journal*.

(D) Statements a and b are correct.

(E) All of the statements above are correct.

38. Which of the following statements is most correct?

(A) The cost of retained earnings is the rate of return stockholders require on a firm's common stock.

(B) The component cost of preferred stock is expressed as kp(1 - T), because preferred stock dividends are treated as fixed charges, similar to the treatment of debt interest.

(C) The bond-yield-plus-risk-premium approach to estimating a firm's cost of common equity involves adding a subjectively determined risk premium to the market risk-free bond rate.

(D) The higher the firm's flotation cost for new common stock, the more likely the firm is to use preferred stock, which has no flotation cost.

(E) None of the statements above is correct.

39. Adams Audio is considering whether to make an investment in a new type of technology. Which of the following factors should the company consider when it decides whether to undertake the investment?

(A) The company has already spent $3 million researching the technology.

(B) The new technology will affect the cash flows produced by its other operations.

(C) If the investment is not made, then the company will be able to sell one of its laboratories for $2 million.

(D) Statements b and c should be considered.

(E) All of the statements above should be considered.

40. Real Time Systems Inc. is considering the development of one of two mutually exclusive new computer models. Each will require a net investment of $5,000. The cash flows for each project are shown below:

Year	Model A	Model B
1	$2,000	$3,000
2	2,500	2,600
3	2,250	2,900

Model B, which will use a new type of laser disk drive, is considered a high-risk project, while Model A is an average-risk project. Real Time adds 2 percentage points to arrive at a risk-adjusted cost of capital when evaluating high-risk projects. The cost of capital used for average-risk projects is 12 percent. Which of the following statements regarding the NPVs for Models A and B is most correct?

(A) $NPV_A = \$ 380; NPV_B = \$1,815$

(B) $NPV_A = \$ 197; NPV_B = \$1,590$

(C) $NPV_A = \$ 380; NPV_B = \$1,590$

(D) $NPV_A = \$5,380; NPV_B = \$6,590$

(E) $NPV_A = \$ 197; NPV_B = \$1,815$

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100 學年度碩士班暨碩士在職專班招生考試試題	科目: 經濟學(2)

本份試卷第一部分為 20 題單選題，每題 3 分，請依題目順序將答案寫在答案卷上

1. Which of the following will cause an increase in the money multiplier
   (A) a reduction in high powered money
   (B) a decrease in the ratio of reserve to checkable deposits
   (C) an increase in high powered money
   (D) an increase in the public's preference for checking deposits as opposed to holding currency

2. Which of the following events will most likely cause an increase in money supply?
   (A) a decrease in the ratio of reserves to deposits
   (B) a central bank sale of bonds
   (C) a shift in public preferences away from checkable deposits to currency
   (D) all of the above

3. Which of the following events will cause the interest rate to increase?
   (A) an increase in income
   (B) an open market sale of bonds by the central bank
   (C) an increase in the ratio of reserves to deposits
   (D) all of the above

4. Suppose there is an increase in consumer confidence. Which of the following represents the complete list of variables that *must* increase in response to this increase in consumer confidence?
   (A) consumption and output
   (B) consumption, investment and output
   (C) consumption, output and the interest rate
   (D) consumption and investment

5. The natural level of employment will decrease when which of the following occurs?
   (A) a reduction in unemployment benefits
   (B) a reduction in the actual unemployment rate
   (C) a reduction in the markup of prices over costs
   (D) none of the above

6. For this question, assume that the economy is initially operating at the natural level of output. An increase in minimum wage will cause:
   (A) a reduction in the real wage in the medium run
   (B) ambiguous effects on the real wage in the medium run
   (C) no change in the real wage in the medium run

(D) an increase in the real wage in the medium run

7. As the proportion of labor contracts that index wages to prices declines, we would expect that:

(A) nominal wages will become more sensitive to changes in unemployment

(B) a reduction in the unemployment rate will now have a smaller effect on inflation

(C) the natural rate of unemployment will decrease

(D) the natural rate of unemployment will increase

8. Suppose individuals expect that interest rates will fall in the future. Also assume that the central bank wants to prevent any change in current output. Given this goal of the central bank, the central bank should implement a policy in the current period that:

(A) shifts the IS curve leftward

(B) shifts the LM curve upward

(C) shifts the IS curve leftward and the LM curve upward

(D) shifts the IS curve rightward

9. Suppose there is a fiscal expansion in the current period. This fiscal expansion will tend to cause a smaller increase in current output when:

(A) an increase in the current interest rate causes expectations of expansionary monetary policy in the future.

(B) an increase in the current interest rate causes an increase in expected future interest rates.

(C) an increase in current output causes an increase in expected future output.

(D) both A and B

10. If neither investment nor consumption depends on the interest rate, then the IS curve is _____ and _____ policy has no effect on output.

(A) vertical; monetary

(B) horizontal; monetary

(C) vertical; fiscal

(D) horizontal; fiscal

11. You are a fan of both Jolin and A-Mei. The two superstars will hold concerts at different places on the same day. You are willing to pay 3,000 for a ticket to Jolin's concert at most. The ticket to Jolin's concert is now sold for 2,000. One of your friends gives you a free ticket to A-Mei's concert. You can only go to one concert at the same time. Assume there are no other implicit or explicit costs of going to either concert. What is the opportunity cost of going to A-mei's concert?

(A) 3,000 　　(B) 2,000 　(C) 1,000 　　(D) 0

12. Which of the following is NOT a public good?

   (A) A common park

   (B) A lighthouse

   (C) The national defense system

   (D) The fireworks displayed on the top of Taipei 101 building.

13. The nature of Economic Cooperation Framework Agreement (ECFA) signed by Taiwan's Government and Mainland China is

   (A) A free trade agreement

   (B) A memorandum of understanding (MOU) of financial industry

   (C) A peace agreement

   (D) An agreement to facilitate capital and financial investment between Mainland China and Taiwan

14. Which of the following is NOT a source of market failure?

   (A) Monopoly power

   (B) Information asymmetry between buyer and seller

   (C) Over-competition

   (D) Externality

15. Which of the following is NOT a characteristic of competitive market equilibrium?

   (A) Sellers are producers with the lowest production cost

   (B) Buyers are consumers with the highest willingness to pay

   (C) There are no other ways to make everyone better.

   (D) Everyone will agree with the efficient and fairness of the equilibrium.

16. Suppose Taiwan's government adopt luxury tax on items such as expensive cars and private air planes. Which of the following statement is NOT true?

   (A) The trading volume of luxury goods will decrease

   (B) The price of luxury goods will increase

   (C) The more elastic the demand of luxury good, the higher are the tax revenues.

   (D) The more elastic the demand of luxury good, the heavier is the tax burden on the seller.

17. Who are the Nobel Prize winners in Economic Science in the year of 2010?

   (A) Leonid Hurwicz , Eric S. Maskin , and Roger B. Myerson, for having laid the foundations of mechanism design theory

   (B) Oliver E. Williamson, for his analysis of economic governance, especially the boundaries of

the firm

(C) Paul Krugman, for his analysis of trade patterns and location of economic activity

(D) Peter A. Diamond , Dale T. Mortensen, and Christopher A. Pissarides, for their analysis of markets with search frictions

18. The minimum wage in Taiwan had been increased from \$95 to \$98 dollar per hour in 2010. Which of the following is NOT true after the increase of minimum wage?

(A) The cost of production will increase and employers may layoff some workers and result in unemployment.

(B) This policy will not be helpful for those who earn more than \$100 dollar per hour

(C) The side effect of unemployment will be more severe when the labor demand is inelastic

(D) Most of the imported labor form the Philippines will also benefit from this policy.

19. Which of the following is a measure of income inequality?

(A) The Herfindahl index

(B) The Gini index

(C) The poverty line

(D) The Philip curve

20. Which of the following is a potential benefit of a monopolistic competition market form the point of view of social welfare?

(A) In the long-run equilibrium, firms earn zero profit and there is no deadweight lost

(B) Sellers provide a variety of goods

(C) In the short run, sellers set price equal to the marginal cost

(D) Sellers are not likely to practice price discrimination

本份試卷第二部分為 3 大題計算題，每小題 4 分，未提供計算過程或說明者不計分。

1. (20 分) : Consider the following IS-LM model with prices fixed at $P=1$ (assuming that we are in the short run):
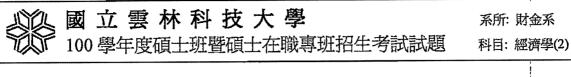
$$\frac{M^d}{P} = Y - r$$

$$C = 1 + 0.5 \times Y$$

$$I = 1 - 0.5 \times r$$

$$G = \overline{G}$$

$$Y = C + I + G$$

$$\frac{M^s}{P} = \frac{\overline{M}}{P}$$

$$\frac{M^d}{P} \le \frac{M^s}{P}, \quad \text{with} \quad \frac{M^d}{P} = \frac{M^s}{P} \quad \text{if} \quad r > 0$$

$$r = i - \pi^e$$

$$\pi^e = 0$$

where M^d, M^s denotes money demand and money supply, respectively. $P, Y, r, C, I, G, i, \pi^e$ denote the price level, output, real interest rate, consumption, investment, government spending, nominal interest rate and inflation expectation, respectively.

(a) Derive the IS curve.

(b) Write down the LM curve.

(c) What is the equilibrium interest rate in the economy?

(d) What is the equilibrium output level in the economy?

(e) Suppose that the economy described above is going through a recession and the government is trying to stimulate the economy. When will monetary policy be effective in stimulating the economy?

2. (12 分) Consider the following game: A and B are roommates. They are considering whether to get a flu vaccine. If neither of them gets the vaccine, the probability of getting a flu (denote by p) is 0.5 for both of A and B. When only one of them get the vaccine, p=0.1 for the one who get the vaccine and p=0.2 for the one without the vaccination. If both of them get the vaccine, p=0.05 for A and B. Suppose the cost of getting a vaccination (denote by C) is 0.2. The payoff is calculated as (-p-C) for A and B.

(a) Do players in this game have dominating strategy? (please describe the strategy if your answer is yes)

(b) Is there any Nash Equilibrium in this game? (please find out all Nash Equilibriums if your answer is yes)

(c) Suppose Government import a safer and cheaper vaccine and therefore C decreases to 0.1, please find out all Nash Equilibriums if there are any.

3. (8 分) Mr. Wang hires some workers to provide car wash service. The price of car wash is 100, which is determined by the competitive market. The relationship between the number of worker hired and the number of car washed is shown below:

# Worker	1	2	3	4	5	6	7	8	9	10
# Car	2	16	30	43	52	59	66	71	73	74

(a) Suppose the wage is set at 1,100 by the labor market, how many workers will Mr. Wang hire?

(b) Suppose the wage decrease to 800, how many workers will Mr. Wang hire?

1. (10 points)   A local bank reviewed its credit card policy with the intention of recalling some of its credit cards.   In the past, approximately 5% of cardholders defaulted, leaving the bank unable to collect the outstanding balance.   Hence, management established prior probability of 0.05 that any particular cardholder will default.   The bank also found that the probability of missing a monthly payment is 0.20 for customers who do not default.   Of course, the probability of missing a monthly payment for those who default is 1.

    Given that a customer missed one or more monthly payments, compute the posterior probability that the customer will default.

2. (10 points)   A shipment of 10 items has two defective and eight non-defective items.   In the inspection of the shipment, a sample of items will be selected and tested.   If a defective item is found, the shipment of 10 items will be rejected.

    If a sample of three items is selected, what is the probability that the shipment will be rejected?

3. (10 points)   If the joint probability density of X and Y is given by

    $$f(x,y) = \begin{cases} \dfrac{2}{3}(x+2y) & for \quad 0<x<1, \quad 0<y<1 \\ \\ 0 & elsewhere \end{cases}$$

    find the conditional variance of X given $Y = \dfrac{1}{2}$.

4. (10 points)   If the joint density of X_1 and X_2 is given by

    $$f(x_1,x_2) = \begin{cases} 6 \cdot e^{-3x_1-2x_2} & for \quad x_1>0, \quad x_2>0 \\ 0 & elsewhere \end{cases}$$

    find the probability density of $Y = X_1 + X_2$.

5. (10 points)   If X has the exponential distribution given by

    $$f(x) = \begin{cases} e^{-x} & for \quad x>0 \\ 0 & elsewhere \end{cases}$$

    find the probability density of the random variable $Y = \sqrt{X}$.

6. (15 points)

   (a) Suppose that a simple regression has quantities $\sum (y_i - \bar{y})^2 = 631.63$ and

   $\sum \hat{e}_i^2 = 182.85$, find R^2.

   (b) Suppose that a simple regression has quantities N=20, $\sum y_i^2 = 5930.94$,

   $\bar{y} = 16.035$, and SSR=666.72, find R^2.

   (c) Suppose that a simple regression has quantities R^2=0.7911, SST=552.36, and N=20, find $\hat{\sigma}^2$.

7. (10 points) Suppose our estimate model is $y_i = \beta x_i + u_i$, i=1,...,n, However, the real model is $y_i = \alpha + \beta_0 x_i + v_i$, where $E(v_i \mid x) = 0$ and

   $Var(v_i \mid x) = \sigma_0^2$. Find the variance of OLS estimator of β.

8. (5 points)　Which of the following model(s) will result in perfect multicollinerity problem?
   (a) $y = \alpha + \beta x + \gamma(1/x) + u$
   (b) $y = \alpha + \beta x + \gamma(x^2) + u$
   (c) $y = \alpha + \beta(\ln x) + \gamma(\ln x^2) + u$

9. (10 points)　Suppose there are two factors A and B. Each factor has four categories. Please finish the following table

Source of variance	sum of square	degrees of freedom	average	F value
A	60.2	___	___	___
B	12.3	___	___	___
Cross	___	___	4.1	___
Error	___	___	___	
Total	237.8	___		

10. (10 points)　Let $\hat{\vartheta}$ is an unbiased estimator of ϑ_0, Z is a random variable that mean and variance are all equal to one, and $cov(\hat{\theta}, Z)$=2. Find the Variance and mean square error (MSE) of $\tilde{\theta} = \hat{\theta} - Z$.