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I. Multiple Choice (1 point each)

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

- Suppose the demand function for a good is expressed as $Q = 200 - 4p$. If the good currently sells for \$30, then the price elasticity of demand equals
 - 1.
 - 1.5.
 - 4.
 - 6.67.
- If Andy likes broccoli (B) but hates cabbage (C), which of the following might best represent his utility function for broccoli and cabbage?
 - $U = B + C$
 - $U = \min\{B, C\}$
 - $U = U/C$
 - $U = B^{0.5}C^{0.5}$
- As the price of a Giffen good falls, the consumer will
 - purchase more units.
 - purchase fewer units.
 - not change the amount purchased.
 - There is not enough information to answer this question.
- What will happen to the equilibrium price of new textbooks if more students attend college, paper becomes more expensive, textbook authors accept lower royalties, and more used textbooks are sold?
 - Price will rise.
 - Price will fall.
 - Price will stay exactly the same.
 - The price change will be ambiguous.
- With capital on the vertical axis and labor on the horizontal axis, vertical isoquants imply that
 - capital and labor are perfect substitutes.
 - capital and labor must be used together in certain proportion.
 - capital is not productive.
 - labor is not productive.

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6. In a monopolistically competitive market, the entry of new firms will lead to the demand curve of an incumbent firm become
- steeper.
 - flatter.
 - remain the same.
 - none of the above.
7. Which of the following statement is wrong for an oligopolistic market?
- A firm in the market has a supply curve.
 - The market outcomes could be like a monopoly.
 - When the number of firms in the market getting large, this market will approach to a perfectly competitive market.
 - The owners of firm consider the output effect and the price effect when making production decisions.
8. Which of the following statement is wrong for a perfectly competitive market?
- Some firms might earn profit in the long run.
 - For a firm, average revenue equals marginal revenue.
 - When the fixed cost is zero, a firm will leave the market when it earns negative profit.
 - The market long-run supply curve is always horizontal at the price.
9. Which of the following statement is wrong?
- In a perfectly competitive market which all firms have the same cost structure, the firms will produce at the efficient scale in the long run.
 - Under the average cost pricing, a monopoly will not create deadweight losses.
 - A competitive market might not as efficient as a monopoly.
 - Price discrimination might create deadweight losses.
10. Consider the production possibilities frontier of two goods. Which of the following statement is wrong?
- A slope of the PPF measures the opportunity cost between the two goods that producers face.
 - The production point will not lie to the right of the PPF.
 - The consumption point will not lie to the right of the PPF.
 - The production point and the consumption point could be different points.

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11. After a certain nation changed its policy from one that banned international trade in wheat to one that allowed international trade in wheat, the nation began importing wheat. As a result, total surplus in the wheat market increased by \$10 million. Which of the following changes could have occurred as well?

- A. The price of wheat in that nation increased with the adoption of the new policy.
- B. The domestic quantity of wheat supplied increased with the adoption of the new policy.
- C. Consumer surplus in the wheat market increased by \$7 million and producer surplus in the wheat market increased by \$3 million.
- D. Consumer surplus in the wheat market increased by \$15 million and producer surplus in the wheat market decreased by \$5 million.

12. Which of the following events would be consistent with purchasing-power parity?

- A. The price level in the United States rises more rapidly than that in Ireland and the real exchange rate defined as Irish goods per unit of U.S. goods stays the same.
- B. The money supply in the United States rises more rapidly than in Egypt and the nominal exchange rate defined as Egyptian pounds per dollar falls.
- C. Earl, a worldwide traveler, looks at exchange rates and worldwide breakfast prices one morning and finds that whatever country he decides to go to he can convert \$15 into enough local currency to buy the same breakfast.
- D. All of the above are correct.

13. According to classical macroeconomic theory, in the long run

- A. monetary growth affects both real and nominal variables.
- B. the only real variable affected by monetary growth is the unemployment rate.
- C. a number of factors that affect unemployment are influenced by monetary growth.
- D. monetary growth affects nominal but not real variables.

14. Jennifer took out a fixed-interest-rate loan when the CPI was 100. She expected the CPI to increase to 103 but it actually increased to 105. The real interest rate she paid is

- A. higher than she had expected, and the real value of the loan is higher than she had expected.
- B. higher than she had expected, and the real value of the loan is lower than she had expected.
- C. lower than she had expected, and the real value of the loan is higher than she had expected.
- D. lower than she had expected, and the real value of the loan is lower than she had expected.

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<p>15. There is a temporary adverse supply shock. Given the effects of this shock, if the central bank chooses to return unemployment closer to its previous rate it would</p> <p>A. raise the rate at which it increases the money supply. In the long run this will shift the short-run Phillips curve right.</p> <p>B. raise the rate at which it increases the money supply. In the long run this will shift the short-run Phillips curve left.</p> <p>C. reduce the rate at which it increases the money supply. In the long run this will shift the short-run Phillips curve right.</p> <p>D. reduce the rate at which it increases the money supply. In the long run this will shift the short-run Phillips curve left.</p> <p>16. Which one of the following will increase the supply of money in the economy, everything else held constant?</p> <p>A. If the general public in the economy decides to hold more currency in the pockets.</p> <p>B. If the banking system decides to reduce the holding of excess reserves.</p> <p>C. The central bank sells bonds to the general public.</p> <p>D. The central bank sells its foreign currency reserves.</p> <p>17. Which one of the following is not considered to be “conventional monetary policy tool”?</p> <p>A. Open market operation.</p> <p>B. Reserve requirement ratio.</p> <p>C. Discount rate and lending.</p> <p>D. Large scale asset purchases.</p> <p>18. In the December 2021 statement, the FOMC “decided to keep the target range for the federal funds rate at 0 to 1/4 percent.” What is the federal funds rate?</p> <p>A. The interest rate anyone needs to pay to borrow money from the government.</p> <p>B. The interest rate banks receive by depositing money with the central bank.</p> <p>C. The interest rate banks pay to borrow money from the central bank.</p> <p>D. The interest rate banks pay to borrow money from other banks.</p> <p>19. Since 2014, the ECB has adopted a negative interest rate policy. What is the rate that is negative?</p> <p>A. The interest rate the ECB pays to banks for depositing money with the ECB.</p> <p>B. The interest rate that the ECB lends to banks.</p>					

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- C. The interest rate that the banks lend and borrow from other banks.
D. The rate of Eurodollar.

20. Everything else held constant, which of the following does not cause aggregate demand to increase?

- A. An increase in consumer spending.
B. An increase in investment spending.
C. An increase in taxes.
D. An increase in exports.

II. Problems and Short-essay Questions

Please answer the following questions IN SEQUENCE. All questions may be answered in either Chinese or English.

1. Suppose that the inverse demand curve for paper is $p = 150 - Q$. Paper is produced with a constant marginal cost of 10. For simplicity, assume that there are no fixed costs. Producing paper creates pollution. Each unit of production generates an external cost of 80 to the residents who live near the paper mill(s).

A. (7 points) What are the equilibrium price, quantity and the associated deadweight loss if paper is produced by perfectly competitive firms?

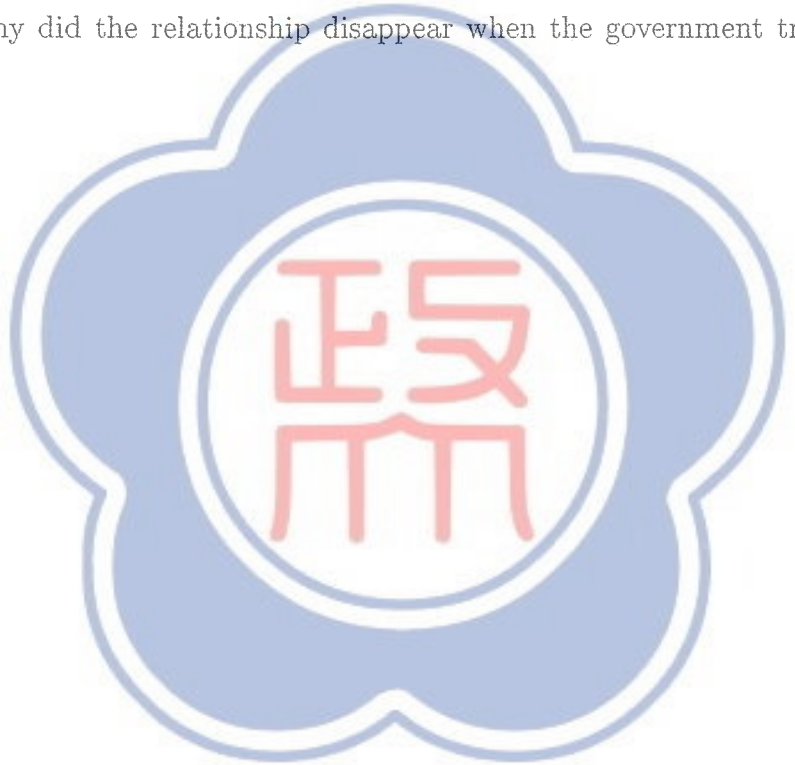
B. (7 points) What are the equilibrium price, quantity and the associated deadweight loss if paper is produced by a monopoly?

C. (6 points) Suppose the residents can costlessly negotiate with the monopoly. What is the equilibrium quantity of paper produced? What is the minimum monetary transfer from the residents to the monopoly that can achieve the social optimum?

2. Assume Taiwan is a small country and imports pork under free trade. The demand and supply are all linear. The consumers of Taiwan consume 1 million kilograms of pork per year. 400,000 of those are produced domestically and 600,000 are imported.

A. (10 points) Assume due to some reasons, the international price of pork falls by 100 dollars per kilogram. The consumers now consume 1.2 million kilograms of pork per year. 1 million of them are imported. Please calculate the welfare gain and the change of the producer surplus of the economy of Taiwan.

B. (10 points) If the government sets up a quota that only allows 400,000 kilograms of pork to be imported. After this policy, the price of pork in Taiwan rises by 150 dollars. Please calculate the deadweight loss for this policy.

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<p>3. Suppose Taiwan makes a decision to tax the import of agricultural products from abroad, but it does not decrease taxes or increase any other government spending to offset this tax revenues. Using diagrams and words, show and explain what happens to</p> <ul style="list-style-type: none">A. (12 points) national saving, domestic investment, net capital outflow and the interest rate;B. (4 points) the exchange rate; andC. (4 points) the amount of exports, imports and trade balance. <p>4. (20 points) Please explain, in words, why did the relationship of the Phillips curve exist in the past, and then why did the relationship disappear when the government tried to use it to boost the economy?</p> <div data-bbox="399 739 1197 1500" style="text-align: center;"></div>					
備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。				

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Part I. Multiple Choice Questions (40 points, 4 points each)

1. (4pts) If a firm has a negative cash flow from assets (CFFA) every year for several years, which of the following statement is most likely true?
- The firm may continually increase its book value of total assets.
 - The firm must also have a negative cash flow from operations each year.
 - The firm is operating at a high level of efficiency.
 - The firm is repaying debt every year.
 - The firm has negative net income in these years.
2. (4pts) Computer Associates International, Inc., a B2B software company, was accused of overstating its revenue in 1998 and 1999 to inflate its stock price. Sanjay Kumar, the former CEO and chairman of the firm, has been sentenced to 12 years in prison for that. The financial fraud the firm committed was mainly related to earnings manipulation. Massive revenues were recognized in the quarter before they materialized. In retrospect, investors may be able to detect this kind of fraud by noticing
- the stock price grew much faster than the other firms.
 - the growth in quarterly earnings outpaced total revenue.
 - the days' sales in receivables increased substantially
 - the profit margin went down unexpectedly
 - the return on equity went up significantly
3. (4pts) Venonat Inc. currently can choose from the following two mutually exclusive projects. Their expected cash flows are

Year	Project A	Project B
0	-\$100	-\$100
1	50	30
2	40	40
3	40	70

If these two projects bear the same risk, which is also equivalent to the firm average, and the firm is indifferent to both, what is closest to the WACC of Venonat?

- 11.1%
- 15.8%
- 17.6%
- 19.8%
- 22.5%

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4. (4pts) A project has an initial requirement of \$ 260,000 for fixed assets and \$16,500 for net working capital. The net working capital remains constant till the end of the project. The fixed assets depreciate to zero over the four-year life of the project and have an estimated salvage value of \$50,000. All the net working capital will be recouped at the end of the project. The annual operating cash flow is \$82,500, and the discount rate is 15 percent. What is the project's net present value if the tax rate is 21 percent?
- A) -\$8,946.10
 B) \$9,670.33
 C) \$12,345.34
 D) \$15,684.29
 E) \$16,343.27
5. (4pts) Fahrenheit Corporation plans to borrow just enough money to repurchase 100,000 shares. The company currently has 3.1 million shares outstanding with \$4.00 EPS. The share price at the time of buyback is \$50, and the after-tax cost of borrowing is 6%. Fahrenheit's earnings per share after the buyback will be closest to
- A) \$4.23
 B) \$4.10
 C) \$4.03
 D) \$3.92
 E) \$3.77
6. (4pts) You run a regression of a stock's returns versus a market index and find the following:

	Coefficients	95% Conf. Interval	
Intercept	0.789	-1.556	3.134
Slope	0.890	0.654	1.126

Based on the data, you know that the stock _____.

- A) earned a positive alpha that is statistically significantly different from zero
 B) has a beta precisely equal to 0.890
 C) has a beta with a 99% probability to be between 0.654 and 1.126
 D) bears the systematic risk with a very high probability
 E) None of the above

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<p>7. (4pts) A pension fund has an average duration of its liabilities equal to 12 years. The fund is looking at 5-year maturity zero-coupon bonds and 4% yield perpetuities to immunize its interest rate risk. How much of its portfolio should it allocate to the zero-coupon bonds to immunize if there are no other assets funding the plan?</p> <p>A) 66.67% B) 52.38% C) 47.62% D) 33.33% E) None of the above</p> <p>8. (4pts) A stock is currently selling for \$71.75. The call option with an exercise price of \$72 that expires in 35 days costs \$1.15, and the corresponding put option costs \$1.33. The short-term interest rate is 1%. If you want to construct a riskless arbitrage position, you should</p> <p>A) buy the call and sell the put B) write the call and buy the put C) write the call and buy the put and buy the stock and borrow the present value of the exercise price D) buy the call and buy the put and short the stock and lend the present value of the exercise price E) do none of the above.</p> <p>9. (4pts) Suppose you purchase one share of the stock of Machop Corporation at the beginning of year 1 for \$30. At the end of year 1, you receive a \$2 dividend and buy one more share for \$30. At the end of year 2, you receive total dividends of \$4 (i.e., \$2 for each share) and sell the shares for \$36 each. The dollar-weighted and the time-weighted returns on your investment are</p> <p>A) 8.53%; 16.24% B) 8.53%; 8.7% C) 12.35%; 8.7% D) 19.20%; 16.24% E) None of the above</p> <p>10. (4pts) The yield on a 1-year bill in the U.K. is 0.64%, and the present exchange rate is 1 pound = U.S. \$1.35. If you expect the exchange rate to be 1 pound = U.S. \$1.25 a year from now, the return a U.S. investor can expect to earn by investing in U.K. bills is</p> <p>A) -7.4%. B) -6.8%. C) 0.64%. D) 1.25%. E) None of the options are correct.</p>					

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Part II. Calculation and Short Essay Questions (60 pts):

1. Below is some of the selected financial information for Home Depot (NYSE: HD) from different years. All numbers are in millions except for the SHARE PRICE is in dollars. Please answer the following questions with the data in this table. If you can include *numbers* in your conclusion, do not just offer a descriptive answer.

Fiscal Year:	2006	2008	2009	2016	2017	2018	2019
BALANCE SHEET							
ASSETS							
Cash & Equivalents	614	525	1,427	2,538	3,595	1,778	2,133
Receivables - Total (Net)	3,223	972	964	2,029	1,952	1,936	2,106
Inventories - Total	12,822	10,673	10,188	12,549	12,748	13,925	14,531
Current Assets - Total	18,000	13,362	13,900	17,724	18,933	18,529	19,810
Plant, Property & Equip (Net)	26,605	26,234	25,550	21,914	22,075	22,375	28,365
TOTAL ASSETS	52,263	41,164	40,877	42,966	44,529	44,003	51,236
LIABILITIES							
Accounts Payable	7,356	4,822	4,863	7,000	7,244	7,755	7,787
Notes Payable				710	1,559	1,339	974
Total Current Liabilities	12,931	11,153	10,363	14,133	16,194	16,716	18,375
Long Term Debt	11,643	9,667	8,662	22,349	24,267	26,807	33,736
TOTAL LIABILITIES	27,233	23,387	21,484	38,633	43,075	45,881	54,352
SHAREHOLDERS' EQUITY							
Common Stock	121	85	86	88	89	89	89
Capital Surplus	7,930	6,048	6,304	9,787	10,192	10,578	11,001
Retained Earnings (Net Other)	33,362	12,016	13,588	34,652	39,369	45,651	50,990
Less: Treasury Stock	16,383	372	585	40,194	48,196	58,196	65,196
TOTAL SHAREHOLDERS EQUITY	25,030	17,777	19,393	4,333	1,454	-1,878	-3,116
INCOME STATEMENT							
Sales (Net)	90,837	71,288	65,955	94,595	100,904	108,203	110,225
Cost of Goods Sold	61,054	47,268	43,571	62,282	66,548	70,837	72,419
Selling, General, & Admin Expenses	18,348	16,927	15,732	17,095	17,694	19,513	19,740
Depreciation, Depletion, & Amortiz	1,762	1,783	1,703	1,754	1,811	2,076	2,223
Operating Income After Depreciation	9,673	5,310	4,949	13,464	14,851	15,777	15,843
Interest Expense	427	644	680	973	1,057	1,051	1,201
Net Income (Loss)	5,761	2,260	2,661	7,957	8,630	11,121	11,242
Cash Dividends	1,395	1,521	1,525	3,404	4,212	4,704	5,958
COMMON SHARES	1,970	1,696	1,698	1,203	1,158	1,105	1,077
SHARE PRICE at Fiscal Year End	40.74	21.53	28.01	137.58	200.90	183.53	228.10

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<p>A) (5pts) Comment on the capital structure decision of Home Depot in the past four years with an existing theory or theories. Please start with its increasing liabilities and continued shares buyback.</p> <p>B) (5pts) Please evaluate the financial strength of this firm moving forward to 2020 and beyond. Start with the negative TOTAL SHAREHOLDERS EQUITY.</p> <p>C) (5pts) Do you think this firm should keep buying back shares? Why or why not?</p>					
<p>2. You are a pension fund manager, and, like all other pension fund managers in the world, your fund is underfunded. Your first and foremost goal is to increase the fund's profits so that your clients can receive the pensions they deserve.</p> <p>A) (5pts) Two mutual fund managers approached you to solicit their products. One is to pick stocks from all Taiwanese firms, and the other is to choose only Taiwanese firms with good ESG (Environment, Social, and Governance) performance. Which one is more likely to outperform the other if these two mutual fund managers are equally capable? State the definition of "performance" in your answer and cite the theories that lead to your conclusion.</p> <p>B) (5pts) Your fund owns a stock that its firm just announced a plan for an ESG overhaul. Its CEO claimed to spend an amount equivalent to one-tenth of its previous capital spending each year on several ESG programs for the next ten years. This ESG overhaul is a bold move that no other firm with the same size and in the same industry could match. Should you buy more of this company's stock or reduce your exposure to this firm? Start with your assumptions on the future cash flows and the discount rate. Please state your reason clearly.</p>					
<p>3. Castform Inc. just paid an annual dividend of \$1 per share but plans to double the cash dividend every year for three consecutive years. After that, the firm expects to maintain a constant dividend payment. The required return is 16 percent given the risk of the firm.</p> <p>A) (5 pts) What is the price of this stock today?</p> <p>B) (5 pts) The current risk-free rate is 1 percent, and a financial analyst believes that the company's beta should be 2 with the market risk premium equal to 8.5 percent. The assumptions on the future cash dividends are still intact. What should the current price be with this alternative view? Shall this analyst recommend selling or buying?</p>					

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4. Suppose A and B are two firms with the same business risk. Firm A has an equity beta of 1.5, a debt-to-equity ratio of 0.4, and a marginal tax rate of 30 percent. Firm B is an all-equity firm. Assuming the bankruptcy risk is negligible for these two firms in the current economic environment.

- A) (5pts) What is the beta of firm B in equilibrium? Which firm is expected to have a higher stock return?
- B) (5pts) A and B currently have comparable asset items in the balance sheet, and they are equally efficient in production. If these two firms have the same payout ratio and use only retained earnings as the source of financing, which one can grow faster? If you need to use assumptions not yet presented, please state clearly.

5. Below are the estimates of the CAPM and the Fama-French 3-factor model for a Taiwanese firm, with monthly observations from January 2011 to December 2015. *t*-values are in the parentheses.

	CAPM	FF-3
Intercept	-0.978% (-1.28)	-0.742% (-0.958)
$r_M - r_f$	1.326 (6.15)	1.235 (5.430)
SMB		0.246 (0.667)
HML		0.692 (1.612)
R-square	0.394	0.426

- A) (5pts) Suppose the risk-free rate is 1%, the market risk premium is 6%, the risk premium on SMB is 2%, and the risk premium on HML is 3%. What is the expected return you would report with the results of these two models?
- B) (5pts) What is the role of the intercept in the previous question?
- C) (5pts) What would you do if you were tasked with estimating the market risk premium for this valuation? State clearly how you would reach the estimation and where to find the necessary data.

備

註

- 一、作答於試題上者，不予計分。
二、試題請隨卷繳交。

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注意：「本科可使用一般計算機，但不得攜帶且不得使用具儲存程式功能之計算機」

- (15%) Suppose we have three boxes, the first of which has 1 red ball and 9 white balls, the second of which has 5 red balls and 5 white balls, and the third of which has 9 red balls and 1 white ball. A box is chosen at random and a ball is sampled. Given that the observed ball is red, what is the probability that the third box was chosen? (Hint: 機率以分數表示)
- (20%) The share price of some stock company varies in a random manner, such that the price increase each minute is described by a discrete random variable X (measured in dollars), with the following probability mass:

$$f_X(x) = \begin{cases} 0.5, & x = +0.05 \\ 0.2, & x = 0.00 \\ 0.3, & x = -0.05 \end{cases}$$

- (10%) Calculate $E(X) = \mu$ and $var(X) = \sigma^2$.
 - (10%) Use the Central Limit Theorem to estimate the probability that the price will increase by 1.20 dollars, or more, after 3 hours.
- (15%) A financial officer for a company wants to estimate the percent of accounts receivable that are more than 30 days overdue. He surveys 500 accounts and finds that 300 are more than 30 days overdue. Compute a 90% confidence interval for the true percent of accounts receivable that are more than 30 days overdue, and interpret the confidence interval.
 - (15%) The following data provides a recent survey of the youngest online entrepreneurs whose net worth is estimated at one million US dollars or more. Their ages range from 17 to 30. The third column of the table illustrates the number of entrepreneurs who correspond to the specific age group and their net worth. Are the ages and net worth independent? Perform a test of independence at the 5% significance level. (Hint: State the null hypothesis, expected values for the number of entrepreneurs, test statistics, decision rule and conclusion.)

Age Group	Net Worth Value	Number of Entrepreneurs
17-25	1-5	8
26-30	1-5	6
17-25	6-24	7
26-30	6-24	5
17-25	≥ 25	5
26-30	≥ 25	9

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5. (20%) A consumer research group is interested in testing an automobile manufacturer's claim that a new economy model will travel at least 25 miles per gallon of gasoline ($H_0: \mu \geq 25$).
- (10%) With a .02 level of significance and a sample of 30 cars, what is the decision rule based on the value of \bar{x} for the test to determine whether the manufacturer's claim should be rejected? Assume that σ is 3 miles per gallon.
 - (10%) What is the probability of committing a Type II error if the actual mileage is 23 miles per gallon?
6. (15%) A sales manager collected the following data on annual sales (y) for new customer accounts and the number of years of experience (x) for a sample of 10 salespersons. An estimated regression equation is $\hat{y} = 80 + 4x$. Compute the coefficient of determination R^2 and interpret.

Salesperson	Years of Experience (x)	Annual Sales (\$1000s) (y)
1	1	80
2	3	97
3	4	92
4	4	102
5	6	103
6	8	111
7	10	119
8	10	123
9	11	117
10	13	136

Note:

- The CDF of the standard normal distribution is denoted by the Φ function:
 $\Phi(x) = P(Z \leq x)$. $\Phi(1.025) = 0.8473$, $\Phi(1.15) = 0.8749$, $\Phi(1.20) = 0.8849$,
 $\Phi(1.22) = 0.8888$, $\Phi(1.282) = 0.90$, $\Phi(1.61) = 0.9463$, $\Phi(1.645) = 0.95$, $\Phi(1.82) = 0.9656$, $\Phi(1.96) = 0.975$, $\Phi(2.051) = 0.9798$.
- Chi-Square Distribution Table: χ^2 critical value with 10 degrees of freedom and a 0.01 probability in the upper tail is $\chi_{0.01,10}^2 = 23.209$. $\chi_{0.025,2}^2 = 7.3778$, $\chi_{0.01,2}^2 = 9.2103$, $\chi_{0.05,2}^2 = 5.9914$, $\chi_{0.025,3}^2 = 9.3484$, $\chi_{0.01,3}^2 = 11.3449$, $\chi_{0.05,3}^2 = 7.8147$.

備

註

- 作答於試題上者，不予計分。
- 試題請隨卷繳交。