

國立高雄大學九十八學年度研究所碩士班招生考試試題

科目：統計學

考試時間：100 分鐘

系所：應用經濟學系

本科原始成績：100 分

是否使用計算機：是

Write your answers on the answer sheet.

I. STATISTICS

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (44pts)

1. Are medical students more motivated than law students? A randomly selected group of each were administered a survey of attitudes toward Life, which measures motivation for upward mobility. The scores are summarized below.

	Medical Students	Law Students
Sample Size	250	100
Mean Score	83.5	80.2
Population Standard Deviation	11.2	9.2

Suppose that the test statistic is $Z = 2.84$. Find the p value if we assume that the alternative hypothesis was a two-tailed test ($H_1 : \mu_M - \mu_L \neq 0$).

- A) 0.0023 B) 0.4977 C) 0.9954 D) 0.0046

2. Investment A has an expected return of 8% with a standard deviation of 2.5%. Investment B has an expected return of 6% with a standard deviation of 1.2%. Assume you invest equally in both investments and that the rates of return are independent. What is the standard deviation of the return on your portfolio? Assume that the returns on the two investments are independent.

- A) 2.5 B) 2.77 C) 6.25 D) 7.69

3. Let the random variable X follow a normal distribution with a mean μ and a standard deviation σ . Let \bar{X}_1 and \bar{X}_2 be the means of samples of sizes 16 and 25, respectively, randomly and independently selected from this population.

Consider the following expressions: (1) $P(\bar{X}_1 < \mu)$, and (2) $P(\bar{X}_2 < \mu)$? Which of the following statements is true?

- A) Unable to determine the relationship between expression 1 and expression 2.
B) Value of expression 2 is greater than value of expression 1.
C) Value of expression 1 is greater than value of expression 2.
D) Value of expression 1 is equal to value of expression 2.

4. Your state is considering raising the legal age for consumption of alcoholic beverages to 21 years old. How large a sample size must be taken to make an estimate of the true proportion of citizens who favor this move, if the error should be no more than 0.01 with 99% confidence?

- A) 16577 B) 9604 C) 6450 D) 13573

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5. A local transportation planning group is concerned about the lack of car-pooling on the part of commuters. They are afraid that the proportion of local drivers car-pooling is below the national average of 20%. What are the appropriate null and alternative hypotheses?
- A) $H_0 : \mu > 0.20$ and $H_1 : \mu \leq 0.20$ B) $H_0 : \mu = 0.20$ and $H_1 : \mu \neq 0.20$
 C) $H_0 : \mu = 0.20$ and $H_1 : \mu < 0.20$ D) $H_0 : \mu = 0.20$ and $H_1 : \mu > 0.20$

6. The results of a two-factor ANOVA without replication are displayed below with missing values, identified by "A" through "G".

	East	South	Midwest	West
Low	87.3	73.2	82.3	76.0
Medium	84.3	69.4	83.2	75.2
High	74.5	72.3	73.4	68.4

ANOVA: Two-Factor Without Replication

SUMMARY

	Count	Sum	Average	Variance
Low	4	*A*	79.7	40.15333
Medium	4		78.025	49.50917
High	4		72.15	7.056667
East	3		82.03333	44.81333
South	3		71.63333	3.943333
Midwest	3		79.63333	29.34333
West	3		73.2	*B*

Source of Variation	SS	Df	MS	F	P-value
Rows	125.765	2	62.8825	"F"	0.039939
Columns	224.843	3	74.946	"G"	0.02274
Error	65.315	"C"	"E"		
Total	415.923	"D"			

What value should replace "E"?

- A) 9.568 B) 8.822 C) 11.344 D) 10.886

7. Suppose you have the following null and alternative hypotheses: $H_0 : \sigma = 34.5$ and $H_1 : \sigma > 34.5$. You take a random sample of 15 observations and find that $s = 48.1$. What is the most accurate statement that you can make about the p -value for this test?

- A) p -value < 0.10 B) p -value < 0.025
 C) p -value < 0.01 D) p -value < 0.05

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8. A tortilla chip manufacturer claims that, on average, they put 16.1 ounces of chips in each bag they produce. However, due to variations in chip size, the standard deviation of the weight of chips in bags is 0.35 ounces. A consumer group buys 40 bags of chips and weighs them. They find the sample mean to be 15.9 ounces. Which of the following statements is true?
- A) We cannot tell if the manufacturer is telling the truth since the sample size is only 40.
B) The manufacturer may be telling the truth. The probability of a sample mean of 15.9 or less is 0.095.
C) It is virtually impossible to get this result if the manufacturer is telling the truth.
D) The manufacturer may be telling the truth. The probability of a sample mean of 15.9 or less is 0.284.
9. The lower limit of a confidence interval at the 95% level of confidence for the population proportion if a sample of size 200 had 40 successes is:
A) 0.1535 B) 0.2554 C) 0.1446 D) 0.2465
10. As shift manager at a local fast food place, you are responsible for ensuring quality control. You do not want to weigh all the frozen hamburger patties that get delivered by your supplier to make sure they weigh four ounces on average, so you have one of your minimum wage earners do it. Assume that the standard deviation of the weight of hamburger patties is known to be 0.1 ounces. You tell your employee that as a shipment comes in, select 20 patties at random. Find the average weight for the 20 patties. If the average weight is less than 3.95 ounces, reject the shipment. What is the significance level associated with your decision rule?
A) 0.023 B) 0.015 C) 0.013 D) 0.008
11. Which of the following statements is not true?
- A) In determining the necessary sample size in making an interval estimate for a population mean, it may be necessary to first make an estimate of the population standard deviation.
B) In the formula $n = Z_{\alpha/2}^2 / ME^2$, ME represents half the width of the confidence interval.
C) If we want to cut the tolerable width of a confidence interval in half, we will have to double the sample size.
D) None of the above.
12. An assembly line will be shut down for maintenance if the defect rate exceeds 2.3%. Suppose you adopt a 5% significance level and take a random sample 200 items off the assembly line and compute the proportions that are defective. For what values of the sample proportion will the assembly line be shut down?
A) 0.036 B) 0.034 C) 0.038 D) 0.04

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13. The joint probabilities shown in a table with two rows, A_1 and A_2 and two columns, B_1 and B_2 , are as follows: $P(A_1|B_1) = 0.10$, $P(A_1|B_2) = 0.30$, $P(A_2|B_1) = 0.05$, and $P(A_2|B_2) = 0.55$. What is $P(B_1)$?
A) 0.6 B) 0.15 C) 0.4 D) 0.85
14. In reference to the Durbin Watson statistic d and the critical values d_L and d_U , which of the following statements is false?
A) If $d < 4 - d_U$, we conclude that there is not enough evidence to show that negative first order autocorrelation exists.
B) If $d_U \leq d \leq 4 - d_U$, we conclude that there is no evidence of first order autocorrelation.
C) If $d > 4 - d_L$, we conclude that the negative first order autocorrelation exists.
D) None of the above.
15. A large mail house which mails such items as catalogues, magazines, and other bulk mailings guarantees that there will be no more than a 3% error rate on its mailing labels. A customer who contracted a mailing to 190,000 individuals experienced a return of 5,900 items, which had incorrect addresses. Using what you have learned concerning the probability of 6000 incorrect addresses, do you think that the mail house has lived up to its guarantee?
A) There is a 2.69 percent possibility that a return of 5900 incorrect addresses could occur if the true error rate is 3%.
B) There is a 0.496 probability that a return of 5900 incorrect addresses could occur if the true error rate is 3%.
C) There is a 3% chance of an incorrect return.
D) There is a 0.004 probability that a return of 5900 incorrect addresses could occur if the true error rate is 3%.
16. A sample of 25 bottles is taken from the production line at a local bottling plant. Assume that the fill amounts follow a normal distribution. Which of the following statements is the most accurate estimate of the probability that the sample standard deviation is more than 40% of the population standard deviation?
A) The probability is smaller than 0.995. B) The probability is smaller than 0.95.
C) The probability is greater than 0.995. D) The probability is smaller than 0.975.
17. You have recently joined a country club. The number of times you expect to play golf in a month is represented by a random variable with a mean of 10 and a standard deviation of 2.2. Assume you pay monthly membership fees of \$500 per month and pay an additional \$50 per round of golf. What is the standard deviation for your average monthly bill from the country club?
A) 180 B) 110 C) 324 D) 220

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18. Because of the popularity of movies as an entertainment medium for college students, you plan to do a national study of the average cost of a movie ticket. If you assume that $\sigma = \$0.50$, what sample size would you have to take to be 95% confident that your estimate was within \$0.25 of the true mean ticket prices?
- A) 7 B) 8 C) 16 D) 15
19. Investment A has an expected return of 7.8% with a standard deviation of 2%. Investment B has an expected return of 7.2% with a standard deviation of 3.1%. Assume the returns on both of these stocks are normally distributed. Which stock is more likely to have a return greater than 10%?
- A) Stock A
B) Stock B
C) The probability is the same for both A and B.
D) Unable to determine
20. The manufacturer of bags of cement claims that they fill each bag with at least 50.2 pounds of cement. Assume that the standard deviation for the amount in each bag is 1.2 pounds. The decision rule is adopted to shut down the filling machine if the sample mean weight for a sample of 40 bags is below 49.8. Suppose that the true mean weight of bags is 50 pounds. Using this decision rule, what is the probability of a Type II error?
- A) 0.85 B) 0.75 C) 0.8 D) 0.7
21. An office of six people is plagued by high absenteeism. It is thought that the probability that an employee is absent on a particular day is 0.03. Assuming that the event that one person is absent on a particular day is independent of the absence of any other employee, what is the probability that at least one employee is absent tomorrow?
- A) 0.18 B) 0.167 C) 0.121 D) 0.15
22. The pooled variance S_p^2 is formed by combining information from two independent samples. If $S_1^2 = 39$, $S_2^2 = 25$, and $n_1=n_2$ then S_p^2 is:
- A) 32 B) 14 C) 64 D) 8
- SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. (6 pts)
23. In a recent survey about US policy in Iraq, 62 % of the respondents said that they support US policy in Iraq. Females comprised 53% of the sample, and of the females, 46% supported US policy in Iraq. A person is selected at random. What is the probability that the person we select is female and support US policy in Iraq?
24. Define the followings **in words**:
- 1) 99% confidence interval
 - 2) Sampling distribution of sample mean with $n=20$

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II. ECONOMETRICS QUESTIONS:

25. (20 pts) Please indicate if each of the following statements about the simple linear regression model is true or false and explain why. Note that no credit will be rewarded without any explanation no matter the answer is true or false. (4 pts each)

- A) The simple regression line estimated by the method of Least Square passes through the sample mean of dependent and independent variable.
- B) The sample covariance between the residuals from the least square regression and the explanatory variable is zero.
- C) If the values of x more widely spread out, the estimate of the slope coefficient is less concise.
- D) “t-statistics is used while conducting the hypothesis testing of the slope coefficient” is based on the assumption of normality of the error term.
- E) If the slope estimator of the Least Squares Regression line is zero, the explained sum of square is zero.

26. (20 pts) According the theory of human capital, a worker's productivity is determined by his or her human capital. Usually years of schooling is used as a proxy for a worker's stock of human capital. A researcher conducted a simple regression, where the dependent variable is the log of hourly wage, **lwage**, and the independent variable is years of schooling, **educ**. The result is reported in the following table. (1) (5 pts) Can you briefly explain what the researcher finds?

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
-----+-----					
educ	.0598392	.0059631	10.03	0.000	.0481366 .0715418
_cons	5.973063	.0813737	73.40	0.000	5.813366 6.132759

However, one of the researcher's colleagues has questioned the accuracy of the estimate. She pointed out that a worker's productivity is also determined by his or her inner ability, which is also correlated with years of schooling. (2) (5 pts) What will be the consequence if her concern is right?

The researcher accepted her suggestion and added another variable, **IQ**, which is the IQ test score of a worker into the regression. A new regression is run and the result is reported in the following table. (3) (5 pts) What is the interpretation of the estimated coefficient of **educ** now? Why is it smaller than the estimate in (1)?

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lwage		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
-----+-----						
educ		.0391199	.0068382	5.72	0.000	.0256998 .05254
IQ		.0058631	.0009979	5.88	0.000	.0039047 .0078215
_cons		5.658288	.0962408	58.79	0.000	5.469414 5.847162

In the end, to investigate whether or not years of schooling is really correlated with inner ability, the researcher regresses **educ** on **IQ**. (4) (5 pts) What will be the estimate of the slope coefficient?

27. (10 pts) Suppose that Y_i and X_i are variables randomly drawn from a population and they exist the following causal relationship, $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$, $i=1 \dots n$, where ε_i is an error term. When the method of Least Square is used to estimate β_0 and β_1 , what are the conditions needed to ensure that the estimators of β_0 and β_1 are unbiased? Explain.

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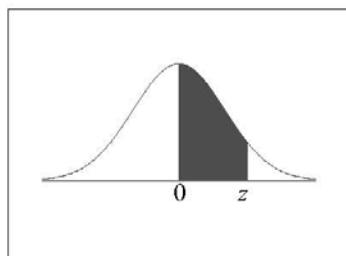
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Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

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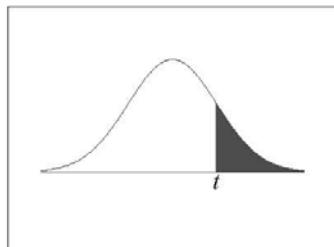
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t-Distribution Table



The shaded area is equal to α for $t = t_\alpha$.

df	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
32	1.309	1.694	2.037	2.449	2.738
34	1.307	1.691	2.032	2.441	2.728
36	1.306	1.688	2.028	2.434	2.719
38	1.304	1.686	2.024	2.429	2.712
∞	1.282	1.645	1.960	2.326	2.576

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1. 【經濟與決策】25 分。

- (1) 1998 年諾貝爾經濟學得主 Amartya Sen 主張「經濟發展本身只是手段，其目的之一即在於促進並實踐自由。」試個人的角度並以經濟學的分析方法評論之。(10 分)
- (2) 銀行徵信產業報告指出：「山寨機(Fake Phone)就是台灣一般習稱「白牌手機」及大陸所稱的「黑手機」的延伸，以仿冒起家，從產品外觀、功能、品牌及產品名稱，都希望以近似原品來混水摸魚，藉由部分消費者識貨不清來獲取利益，…」。根據某平面報紙報導，大陸積極推動家電下鄉，加上全力推動路燈更換，淘寶光電搭上山寨機及路燈題材，預計今年業績將呈現逐季成長，獲利也將擺脫去年谷底，業績後市看俏。試以經濟學的分析方法說明消費者選擇山寨機的模式，並進一步評論生產業者對消費者行為與市場所做的假設或認識。(15 分)

2. 【經濟與市場結構】25 分。

- (1) 假設網際網路有助於提昇產業的競爭力並且此一效果全部呈現在固定成本的降低。在完全競爭市場的架構下，分析網際網路的使用對商品價格、產業產出、個別產商產出以及市場中廠商數量的影響。(10 分)
- (2) 若有 n 個廠商提供同質商品於市場中進行寡占競爭，其中市場需求為 $p=a-bQ$ ，每一廠商的成本為 $C(q_i)=F+cq_i$ ， q_i 為廠商 i 的產出， F 為固定成本。試求出市場的價格、產業的產出與每一廠商的廠出。當 F 下降，廠商可自由進出之前提下，會有何種影響？若平均變動成本提高 50% 且 F 不變下，會有何種影響？(15 分)

3. [About the recent global recession] (20 points = 5+5+10)

Nobel Prize-winning economist Paul Krugman proposed that a “global paradox of thrift” (the phenomenon that, around the world, the amount people want to save exceeds the amount businesses want to invest) is the fundamental cause of the current global recession. Answer the following questions.

- a. Write down the national income accounts identity for a closed economy without public sector. In the sense of accounting (i.e. according to the rule of national income accounting), is it possible to have saving exceed investment in a closed economy? Why or why not? In the sense of economics (i.e. from the viewpoint of producing and consuming goods and services), is it possible to have saving exceed investment in a closed economy? Why or why not?
- b. If saving exceeds investment in the sense of economics, what would happen to the output level of the closed economy? Use a graph representing the Keynesian Cross model to illustrate your answer.
- c. Explain why the asset price bubble in the U.S. and the “overvaluation” of U.S. dollars during the past 10 years may have hidden and postponed the impacts of this global-paradox-of-thrift problem on the global economy.

國立高雄大學九十八學年度碩士班招生考試試題

科目：經濟學

考試時間：100 分鐘

系所：

應用經濟學系

是否使用計算機：否

本科原始成績：100 分

4. [The Solow growth model] (18 points = 4+8+6)

Consider an isolated country whose economy can be well described by the Solow growth model with population growth. Assume that the economy has the following production function:

$Y = K^{0.5} \times L^{0.5}$, where Y is the output level, K is the level of capital stock, and L is the number of workers. The production function can also be written in the per-worker form: $y = k^{0.5}$, where $y = Y/L$ and $k = K/L$. Assume the depreciation rate $\delta = 0.04$ and the population growth rate $n = 0.02$.

- Suppose the saving rate $s = 0.6$. Find the steady-state level of output per worker. Also, find the country's economic growth rate in the steady state. Show your calculations.
- Explain the meaning of the Golden-Rule level of capital and find the value of the Golden-Rule level of capital per worker for this economy. Also, what is the saving rate associated with this Golden-rule level? Show your calculations.
- Suppose that this economy is originally in part (a)'s steady state and wants to shift to part (b)'s Golden-Rule level. Draw separate graph to show how y and c (consumption per worker) move overtime. (Show the time path of y and c before and after the shift, considering both the situation during the transition process and the situation approaching the new steady state.)

5. [The *IS-LM* model] (12 points)

Consider a “large” open economy (i.e. an economy whose interest rate is NOT fixed by world financial markets). Suppose the economy is hit by an adverse shock: a collapse of its stock market that lowers many people’s wealth and consumption. What would happen to the level of national income, the interest rate, the level of trade balance, and the exchange rate of this economy in the short run? (Assume the aggregate price level is fixed in the short run.) If the government of the economy wants to keep both the income level and the exchange rate stable in the short run, should it adopt monetary policy or fiscal policy? Use graphs representing the *IS-LM* model and the foreign-exchange market to illustrate your answer.