Multiple Choice (4 points per question)

Identify the choice that best completes the statement or answers the question.　Write down your answers on the Answer Sheet

____ 1.　The expected value of a random variable is

a.　the value of the random variable that should be observed on the next repeat of the experiment

b.　the value of the random variable that occurs most frequently

c.　the square root of the variance

d.　None of these alternatives is correct.

____ 2.　The key difference between the binomial and hypergeometric distribution is that with the hypergeometric distribution

a.　the probability of success must be less than 0.5

b.　the probability of success changes from trial to trial

c.　the trials are independent of each other

d.　the random variable is continuous

____ 3.　X is a normally distributed random variable with a mean of 5 and a variance of 4. The probability that X is greater than 10.52 is

a.　0.0029

b.　0.0838

c.　0.4971

d.　0.9971

The weight of football players is normally distributed with a mean of 200 pounds and a standard deviation of 25 pounds.

____ 4.　The probability of a player weighing more than 241.25 pounds is

a.　0.4505

b.　0.0495

c.　0.9505

d.　0.9010

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f(x) =(1/10) e$^{-x/10}$ x $\geq$ 0

_____ 5.　The probability that x is between 3 and 6 is

a.　0.4512

b.　0.1920

c.　0.2592

d.　0.6065

A professor at a local university noted that the grades of her students were normally distributed with a mean of 73 and a standard deviation of 11.

_____ 6.　If 69.5 percent of the students received grades of C or better, what is the minimum score of those who received C's?

a.　70.39

b.　67.39

c.　50.39

d.　65.39

_____ 7.　A population consists of 8 items. The number of different simple random samples of size 3 that can be selected from this population is

a.　24

b.　56

c.　512

d.　128

_____ 8.　The sampling error is the

a.　same as the standard error of the mean

b.　difference between the value of the sample mean and the value of the population mean

c.　error caused by selecting a bad sample

d.　standard deviation multiplied by the sample size

_____ 9.　The probability distribution of all possible values of the sample mean $\overline{X}$ is

a.　the probability density function of $\overline{X}$

b.　the sampling distribution of $\overline{X}$

c.　the grand mean, since it considers all possible values of the sample mean

d.　one, since it considers all possible values of the sample mean

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____ 10.　A population has a mean of 80 and a standard deviation of 7. A sample of 49 observations will be taken. The probability that the sample mean will be larger than 82 is

a.　0.5228

b.　0.9772

c.　0.4772

d.　0.0228

____ 11.　The sampling distribution of the sample means

a.　is the probability distribution showing all possible values of the sample mean

b.　is used as a point estimator of the population mean μ

c.　is an unbiased estimator

d.　shows the distribution of all possible values of μ

____ 12.　In the hypothesis testing procedure, α is

a.　the level of significance

b.　the critical value

c.　the confidence level

d.　the coefficient of significance

A random sample of 16 students selected from the student body of a large university had an average age of 25 years and a standard deviation of 2 years. We want to determine if the average age of all the students at the university is significantly more than 24. Assume the distribution of the population of ages is normal.

____ 13.　The *p*-value is between

a.　.005 to .01

b.　.01 to .025

c.　.025 to .05

d.　.05 to .10

A statistics teacher wants to see if there is any difference in the abilities of students enrolled in statistics today and those enrolled five years ago. A sample of final examination scores from students enrolled today and from students enrolled five years ago was taken. You are given the following information.

	Today	Five Years Ago
$\overline{X}$	82	88
σ^2	112.5	54
n	45	36

_____ 14.　The standard error of $\bar{x}_1 - \bar{x}_2$ is

a.　12.9

b.　9.3

c.　4

d.　2

Two major automobile manufacturers have produced compact cars with the same size engines. We are interested in determining whether or not there is a significant difference in the MPG (miles per gallon) of the two brands of automobiles. A random sample of eight cars from each manufacturer is selected, and eight drivers are selected to drive each automobile for a specified distance. The following data show the results of the test.

Driver	Manufacturer A	Manufacturer B
1	32	28
2	27	22
3	26	27
4	26	24
5	25	24
6	29	25
7	31	28
8	25	27

_____ 15.　At 90% confidence the null hypothesis

a.　should not be rejected

b.　should be rejected

c.　should be revised

d.　None of these alternatives is correct.

_____ 16.　For an F distribution, the number of degrees of freedom for the numerator

a.　must be larger than the number of degrees for the denominator

b.　must be smaller than the number of degrees of freedom for the denominator

c.　must be equal to the number of degrees of freedom for the denominator

d.　can be larger, smaller, or equal to the number of degrees of freedom for the denominator

In order to determine whether or not a particular medication was effective in curing the common cold, one group of patients was given the medication, while another group received sugar pills. The results of the study are shown below.

	Patients Cured	Patients Not Cured
Received medication	70	10
Received sugar pills	20	50

We are interested in determining whether or not the medication was effective in curing the common cold.

_____ 17. The hypothesis is to be tested at the 5% level of significance. The critical value from the table equals

a. 3.84
b. 7.81
c. 5.99
d. 9.34

A regression and correlation analysis resulted in the following information regarding a dependent variable (y) and an independent variable (x).

$\Sigma X = 90$　　　　$\Sigma (Y - \bar{Y})(X - \bar{X}) = 466$

$\Sigma Y = 170$　　　$\Sigma (X - \bar{X})^2 = 234$

$n = 10$　　　　$\Sigma (Y - \bar{Y})^2 = 1434$

$SSE = 505.98$

_____ 18. The least squares estimate of b_0 equals

a. 0.923
b. 1.991
c. -1.991
d. -0.923

_____ 19. The coefficient of determination equals

a. 0.6472
b. -0.6472
c. 0
d. 1

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The following information regarding a dependent variable (Y) and an independent variable (X) is provided.

Y	X
4	2
3	1
4	4
6	3
8	5

SSE = 6

SST = 16

____ 20. The coefficient of correlation is

a. 0.7906

b. - 0.7906

c. 0.625

d. 0.375

In a regression model involving 30 observations, the following estimated regression equation was obtained.

$$\hat{Y} = 170 + 34X_1 - 3X_2 + 8X_3 + 58X_4 + 3X_5$$

For this model, SSR = 1,740 and SST = 2,000.

____ 21. The test statistic F for testing the significance of the above model is

a. 32.12

b. 6.69

c. 4.8

d. 58

A. $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

B. $E(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

C. $\hat{Y} = b_0 + b_1 X_1 + b_2 X_2$

D. $E(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2$

____ 22. Which equation describes the multiple regression equation?

a. Equation A

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b. Equation B

c. Equation C

d. Equation D

In a laboratory experiment, data were gathered on the life span (Y in months) of 33 rats, units of daily protein intake (X_1), and whether or not agent X_2 (a proposed life extending agent) was added to the rats diet ($X_2 = 0$ if agent X_2 was not added, and $X_2 = 1$ if agent was added.) From the results of the experiment, the following regression model was developed.

$$\hat{Y} = 36 + 0.8X_1 - 1.7X_2$$

Also provided are SSR = 60 and SST = 180.

____ 23.　The life expectancy of a rat that was given 3 units of protein daily, and who took agent X_2 is

a. 36.7

b. 36

c. 49

d. 38.4

____ 24.　The degrees of freedom associated with SSR are

a. 2

b. 33

c. 32

d. 30

In a regression analysis involving 25 observations, the following estimated regression equation was developed.

$$\hat{Y} = 10 - 18X_1 + 3X_2 + 14X_3$$

Also, the following standard errors and the sum of squares were obtained.

$S_{b1} = 3$　　$S_{b2} = 6$　　$S_{b3} = 7$

SST = 4,800　　　　SSE = 1,296

____ 25.　The coefficient of X_2

a. is significant

b. is not significant

c. can not be tested, because not enough information is provided

d. None of these alternatives is correct.

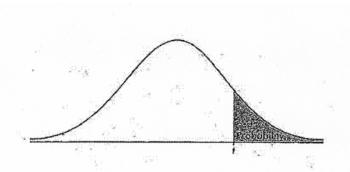科目：統計學　　　　　　　系所：應用經濟學系　　　　是否使用計算機：是
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TABLE B: t-DISTRIBUTION CRITICAL VALUES

df	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001	.0005
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	.765	.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	.741	.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	.727	.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	.718	.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	.700	.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	.695	.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	.694	.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	.692	.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	.691	.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	.690	.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	.689	.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	.688	.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	.688	.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	.687	.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	.686	.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	.686	.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	.685	.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	.685	.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	.684	.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	.684	.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	.684	.855	1.057	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3.421	3.690
28	.683	.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	.683	.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	.683	.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	.681	.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	.679	.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	.679	.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	.678	.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	.677	.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	.675	.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
∞	.674	.841	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.091	3.291
	50%	60%	70%	80%	90%	95%	96%	98%	99%	99.5%	99.8%	99.9%

Confidence level C

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Tables of the Normal Distribution

Probability Content from -oo to Z

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

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Q1. 假設臺灣的鉛筆市場目前是在「長期均衡」的狀態，而所有現存的與潛在的鉛筆生產廠商都有相同的生產技術及成本。

a. 請利用兩個圖：鉛筆市場的供需圖以及某一家鉛筆生產廠商的成本曲線圖來描繪這個長期均衡。請仔細標示你的圖，並清楚說明兩個圖之間的關聯。(6 分)

b. 因為少子化、學童數減少，使得鉛筆的需求下降。在「短期」，所有廠商都處於虧損但仍持續生產的狀態。請沿用(a)小題的圖來描繪這個短期均衡，並說明這個需求下降對市場和個別廠商的影響。請清楚指出市場的價格與數量的變動以及廠商的產量與各成本數值的變動。(6 分)

c. 假設需求長期維持在低水準，請沿用(a)和(b)小題的圖，來說明這個需求下降在「長期」對市場和個別廠商的影響。請清楚指出市場的價格與數量的變動以及廠商的產量與各成本數值的變動(和(a)小題的狀態相比較的變動)。(6 分)

Q2. 一個追求最大利潤的獨占廠商有否可能選擇在需求線上價格彈性(price elasticity of demand)的絕對值小於 1 的點來營運?為什麼?請利用經濟學的直覺來說明你的答案(假設該廠商沒有能力進行差別取價)。(12 分)

Q3. 假設某商品的消費存在負的外部性(negative externalities)。

a. 什麼是消費上負的外部性?請舉例說明。(4 分)

b. 當這個外部性存在時，自由放任下由市場機制決定的數量，和從整個社會資源配置的角度來看最有效率的數量比較起來如何?比較大、比較小、或是一樣大?請作圖說明你的答案。(4 分)

c. 請沿用(b)小題的圖，說明政府如何透過課稅或補貼的手段來矯正這個外部性造成的問題。(4 分)

Q4. 某個廠商使用 K 和 L 兩種要素來生產某商品，這個商品的產量 q 和要素使用量的關係可以用以下的函數來代表：$q = f(L, K)$。該廠商在要素市場是價格接受者，而 K 和 L 的單位價格分別為 r 和 w。

a. 假設該廠商的生產函數具「規模報酬遞減」(decreasing returns to scale)的性質。請問，該廠商的生產成本會呈現「規模經濟」(economies of scale)或是「規模不經濟」(diseconomies of scale)的情形?請解釋你的答案。(6 分)

b. 令 $q = f(L, K) = \sqrt{LK}$。假設該廠商收到一筆數量為 q_0 的訂單，且該廠商希望用最低的成本來生產 q_0。請幫該廠商算出成本最低的生產方法。請清楚列出算式及計算過程。(8 分)

c. 承續(b)小題，請以作圖加說明的方式推導該廠商對 L 的需求線。請仔細標示你作的圖，並簡單說明推導的步驟。(6 分)

d. 請寫出(b)小題所考慮的最小化成本問題的對偶(dual)問題，並以這兩個問題為例簡單說明「對偶性」(duality)。(請勿對對偶問題求解。)(6 分)

Q5. 考慮一個存在許多潛在買方和許多潛在賣方的二手車市場，所有買方和賣方都是風險中立者。假設所有的二手車的性能都只屬於三個可能的等級：A 級、B 級或 C 級中的一級，而 A、B、C 三級車的比例各為 1/3。對原車主(賣方)而言，把 A 級車留下來自己開的話，價值為 9 萬；B 級車價值 6 萬；C 級車為 3 萬。對買方而言，買到不同等級車子的價值(買方的願付價格)如下：A 級車價值 10 萬；B 級車價值 7 萬；C 級車價值 4 萬。請以這個二手車市場為例，對在訊息不對稱(asymmetric information)的情形時可能產生的逆選擇(adverse selection)問題作說明。(12 分)

Q6. 考慮以下某職業球隊(A)和該隊某選手(B)進行薪資談判的賽局。假設 B 目前的月薪為 6 萬元，而雇用 B 可以給 A 帶來相當於每月 8 萬元的價值。賽局以如下方式進行：A 先選擇是否每月為 B 加薪 1 萬元，如果 A 選擇加薪，則依合約規定，B 沒有選擇餘地，只能自動續約，賽局結束。如果 A 選擇不為 B 加薪，則 B 在看到 A 的決定後，可以選擇是否留在該球隊，選擇留下的話，則月薪維持 6 萬元；選擇不留的話，則回老家種田，月收入預計為 2 萬元。賽局參與者的報償(payoffs)以月所得來衡量。

a. 將上述賽局以樹枝圖的形式(extensive form)呈現，並找出賽局的 Subgame Perfect Nash Equilibrium (SPNE)。請簡單說明找解的方法。(6 分)

b. 將上述賽局以矩陣圖的形式(strategic form)呈現，並找出賽局的 Nash Equilibrium (NE)。請簡單說明找解的方法。(提示：A 有「加薪」和「不加薪」兩個策略(strategies)可以選擇；B 有「留下」和「不留下」兩個策略可以選擇。) (6 分)

c. 哪一個解的觀念，NE 還是 SPNE，比較適合用來作為動態賽局(dynamic games)的解?請透過比較 (a)、(b)兩小題的答案作簡短說明。(8 分)

科目：總體經濟學　　　　系所：應用經濟學系
考試時間：100 分鐘　　　本科原始成績：100 分　　是否使用計算機：否

I.　　Multiple-choice Questions (45 points)

1.　Research on the effects of recessions on the real level of GDP shows that
　　A) recessions cause only temporary reductions in real GDP, which are offset by growth during the expansion phase.
　　B) recessions cause large, permanent reductions in the real level of GDP.
　　C) recessions cause both temporary and permanent declines in real GDP, but most of the decline is temporary.
　　D) recessions cause both temporary and permanent declines in real GDP, but most of the decline is permanent.

2. What are the two main components of business cycle theories?
　　A) A description of shocks and a model of how the economy responds to them
　　B) A model of how people decide to spend and a description of the government's role in the economy
　　C) A model of how equilibrium is reached and a description of the government's role in the economy
　　D) A description of shocks and a description of the government's role in the economy

3.　In the short run, an increase in export sales would cause output to _____ and the price level to _____.
　　A) rise; rise
　　B) rise; stay constant
　　C) fall; stay constant
　　D) fall; rise

4. According to Keynesian macroeconomists, prices adjust _____ to shocks, so the government should _____.
　　A) slowly; do little
　　B) rapidly; do little
　　C) rapidly; fight recessions
　　D) slowly; fight recessions

5. An increase in taxes (when Ricardian equivalence doesn't hold) causes the real interest rate to _____ and the price level to _____ in general equilibrium.

    A) rise; rise

    B) rise; fall

    C) fall; rise

    D) fall; fall

6. An increase in expected inflation causes the real interest rate to _____ and output to _____ in the short run, before prices adjust to restore equilibrium.

    A) rise; rise

    B) rise; fall

    C) fall; rise

    D) fall; fall

7. Which of the following is an example of a productivity shock?

    A) The introduction of new management techniques

    B) A change in taxes on corporate profits

    C) A change in the level of government transfer programs

    D) An increase in the money supply

8. The most common measure of productivity shocks is known as

    A) the Solow residual.

    B) the Lucas supply curve.

    C) the Prescott productivity parameter.

    D) the Kydland factor.

9. You and a friend are arguing over the issue of the nonneutrality of money. You believe that money is not neutral, and to prove your point you would cite all of the following EXCEPT

    A) large gold discoveries that increased the money supply preceded an economic boom.

    B) a change in monetary institutions preceded a boom or recession.

    C) a change in the leadership of the Fed and its policy was followed by noticeable changes in the money supply and a recession or inflation.

    D) the fact that every recession was preceded by a drop in the money supply.

10. If the menu cost theory is true, then firms that change prices less frequently than other firms are likely to be in
    A) more competitive industries.
    B) service, rather than manufacturing, industries.
    C) growing, rather than declining, industries.
    D) less competitive industries.

11. According to Keynesians, the primary reason money is not neutral is
    A) rational expectations.
    B) price stickiness.
    C) reverse causation.
    D) misperceptions over the aggregate price level.

12. Historically, Brazil has suffered higher and more variable rates of inflation than Venezuela. You would expect the short-run aggregate supply curve of Brazil to be _____ than that of Venezuela, and the Phillips curve of Brazil to be _____ than that of Venezuela.
    A) flatter; flatter
    B) flatter; steeper
    C) steeper; flatter
    D) steeper; steeper

13. When actual inflation is greater than expected inflation
    A) unemployment falls, according to Phillips-curve analysis.
    B) cyclical unemployment falls, according to Phillips-curve analysis.
    C) there are transfers from borrowers to lenders.
    D) there are transfers from lenders to borrowers.

14. For a given real exchange rate, a nominal appreciation of the domestic currency will result from
    A) a decline in the terms of trade.
    B) an increase in the prices of foreign goods.
    C) an increase in the prices of the domestic goods.
    D) an increase in the domestic rate of inflation.

15. Ricardian equivalence argues that when the government cuts taxes and raises its deficit,

A) consumers anticipate that they will face lower taxes later to pay for the resulting government debt.

B) consumers anticipate that they will higher services from the government.

C) consumers anticipate that they will face higher taxes later to pay for the resulting government debt.

D) consumers anticipate it will affect their future taxes, in general in the direction of lowering future taxes.

II. Essay (20%)

Many demographers predict that the United States will have zero population growth in the twenty-first century, in contrast to average population growth of about 1 percent per year in the twentieth century. Use the Solow model to forecast the effect of this slowdown in population growth on the growth of total output and the growth of output per person. Consider the effects both in the steady state and in the transition between steady state.

III. Numerical Problems (35%)

Consider the following Keynesian closed economy:

Consumption $C^d = 250 + 0.5(Y - T) - 250r$

Investment $I^d = 250 - 250r$

Government purchases $G = 300$

Taxes $T = 300$

Full-employment output $\bar{Y} = 1250$

Nominal money supply $M = 3000$

Real money demand $L = 0.5Y - 500r + \pi^e$

Expected inflation $\pi^e = 0$

(a) (4%) What is the equation of the *IS* curve?

(b) (16%) Calculate the values of the real interest rate, the price level, consumption, and investment for the economy in general equilibrium.

(c) (15%) Now suppose government purchases increases to 350 with no change in taxes. What will be the real interest rate, the price level, output, consumption, and investment in the short run?