



1. Read the paragraphs of the following news and answer questions:

「Taipei, Taiwan, R.O.C. March 5, 2008 - Chunghwa Telecom Co., Ltd. (“CHT” or the “Company”, TAIEX: 2412, NYSE: CHT) today reported its unaudited ROC GAAP February 2008 financial summary.

For the month of February 2008, total revenue increased by 3.6% year-over-year to NT16.0 billion while net income decreased by 47.4% year-over-year to NT1.9 billion. As a result, earnings per share for the month of February 2008 decreased by 44.5% to NT\$0.21, or NT\$2.11 per ADS.

This decrease in net income was primarily due to a NT\$3.0 billion charge for an unrealized valuation loss related to a 10-year foreign currency derivatives contract entered into between the Company and an international investment bank in September 2007. The purpose of the contract is to hedge against capital expenditure payments and international call settlement fees denominated in US dollars. As at February 29, 2008, the Company’s accumulated mark-to-market (“MTM”) unrealized valuation loss relating to the contract was NT\$4.0 billion, as compared to NT\$0.5 billion as at December 31, 2007 and NT\$1.0 billion as at January 31, 2008.

Excluding the NT\$3.0 billion charge, for the month of February 2008, adjusted net income was NT\$4.16 billion and adjusted earnings per share was NT\$4.45 per ADS.

...
Dr. Joseph Shieh, Chief Financial Officer of Chunghwa Telecom, stated, “The contract was classified as a derivative financial instrument for trading purposes, so any changes to the valuation of the contract is calculated as of each reporting period and shown as either a gain or loss on the income statement.....”

- (1) Please explain the meaning of derivative financial instrument? (5%)
- (2) List some examples of derivative financial instrument? (5%)
- (3) What is the purpose for Chunghwa Telecom Co., Ltd to use the derivative contract mentioned in this news? (5%)
- (4) What is the effect on income of using derivative contract by Chunghwa Telecom Co., Ltd’s? Why? (5%)



2. The Sarbanes-Oxley Act of 2002 has caused worldwide attention and led to various amendments to the stock exchanges' regulations. Please answer the following questions:

- (1) What is the major content of Sarbanes-Oxley Act of 2002? (10%)
- (2) What is the purpose of this act? (5%)

3. Multiple choice (15%)

(1) Over the past 75 years, we have observed that investments with higher average annual returns also tend to have the highest standard deviations in their annual returns. This observation supports the notion that there is a positive correlation between risk and return. Which of the following lists correctly ranks investments from having the highest returns and risk to those with the lowest returns and risk?

- a. Large-company stocks, small-company stocks, long-term corporate bonds, long-term government bonds, U.S. Treasury bills.
- b. Small-company stocks, long-term corporate bonds, large-company stocks, long-term government bonds, U.S. Treasury bills.
- c. Large-company stocks, small-company stocks, long-term corporate bonds, U.S. Treasury bills, long-term government bonds.
- d. U.S. Treasury bills, long-term government bonds, long-term corporate bonds, small-company stocks, large-company stocks.
- e. Small-company stocks, large-company stocks, long-term corporate bonds, long-term government bonds, U.S. Treasury bills.

(2) An analyst has estimated how a particular stock's return will vary depending on what will happen to the economy:

<u>State of the Economy</u>	<u>Probability of State Occurring</u>	<u>Stock's Expected Return if this State Occurs</u>
Recession	0.10	-60%
Below Average	0.20	-10
Average	0.40	15
Above Average	0.20	40
Boom	0.10	90



- What is the coefficient of variation on the company's stock?
- 2.121
 - 2.201
 - 2.472
 - 3.334
 - 3.727
- (3). The Altman Company has a debt ratio of 33.33 percent, and it needs to raise \$100,000 to expand. Management feels that an optimal debt ratio would be 16.67 percent. Sales are currently \$750,000, and the total assets turnover is 7.5. How should the expansion be financed so as to produce the desired debt ratio?
- 100% equity
 - 100% debt
 - 20 percent debt, 80 percent equity
 - 40 percent debt, 60 percent equity
 - 50 percent debt, 50 percent equity
4. As you know the central bank in Taiwan controls two key rates to (dis)/stimulate the overall economy, what are the two key rates? (10 pts)
Can you describe the status of the two rates in the past decade? (5 pts)
and why? (5 pts)
Last year people began to talk about the fear of stagflation, what is it? (5 pts)
Starting from this year the central bank has faced a dilemma in terms of the two rates, please describe it? (10 pts)
Financial innovations are two-edged swords. For instance, a wide-spread use of structured notes causes the subprime credit crisis.
Can you give some examples of structured notes? (5 pts)
What is the subprime credit crisis? (10 pts)



Notes: There are four questions in the test. The point weights for each subquestion are assigned. A couple of probability density tables are provided for finding the value of probability.

1. Suppose that the trivariate probability density of X_1 , X_2 and X_3 is given by

$$f(X_1, X_2, X_3) = (X_1 + X_2)e^{-X_3} \text{ for } 0 < X_1 < 1, 0 < X_2 < 1, X_3 > 0$$

$$0 \quad \text{elsewhere}$$

- (a) find the probability $P(0 < X_1 < \frac{1}{2}, \frac{1}{2} < X_2 < 1, 0 < X_3 < 1)$. (7 points)
- (b) find the joint marginal density of X_1 and X_3 . (6 points)
- (c) find the marginal density of X_1 . (6 points)
- (d) find the conditional density $P(\frac{1}{2} < X_2 < 1 \mid 0 < X_1 < \frac{1}{2}, 0 < X_3 < 1)$. (6 points)

2. Assume that X_1, X_2, \dots, X_n constitute a random sample from a normal population with the variance σ^2 . The sample variance is

$$S^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1},$$

$$\text{Where } \bar{x} = \frac{\sum_{i=1}^n x_i}{n}.$$

- (a) Show that $E(S^2) = \sigma^2$ and $Var(S^2) = \frac{2\sigma^4}{n-1}$. (9 points)

- (b) find that 90% confidence interval for σ^2 with $n=20$ and $S^2=0.5$. (8 points)

- (c) Assume that $n=18$ and $S^2=0.68$. Test the following null hypothesis should be rejected or accepted.

$$H_0: \sigma^2 = 0.36 \quad (8 \text{ points})$$

$$H_1: \sigma^2 > 0.36$$

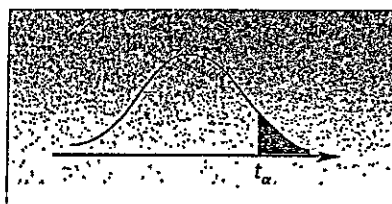
$$\alpha = 0.05$$



3. An article in the *Financial Analysts Journal* reports the results of a regression analysis of returns on stocks (Y) versus the ratio of book to market value (X). The resulting prediction equation is $\text{Return} = 1.21 + 3.1\text{BMV}$. The standard errors of the intercept (β_0) and the slope (β_1) estimates are 0.6 and 2.89 respectively. The sample size used in $n = 18$. Is there evidence of a linear relationship between returns and book to market value?
- What are H_0 and H_1 in terms of β 's for this question? _____ (10 points)
 - Compute the value of the appropriate test statistic. _____ (10 points)
 - What is your conclusion under the 5% significance level? _____ (10 points)
4. An important measure of the risk associated with a stock is the standard deviation, or variance, of the stock's price movements. A financial analyst wants to test the one-tailed hypothesis that stock A has a greater risk (larger variance of price) than stock B . A random sample of 25 daily prices of stock A gives $S_A^2 = 6.52$, and a random sample of 22 daily prices of stock B gives a sample variance of $S_B^2 = 3.47$. Carry out the test at $\alpha = 0.05$.
- Compute the value of the appropriate test statistic. _____ (10 points)
 - What is the critical point of the test statistic at $\alpha = 0.05$. _____ (10 points)



Statistical Tables

TABLE 3 Critical Values of the t Distribution

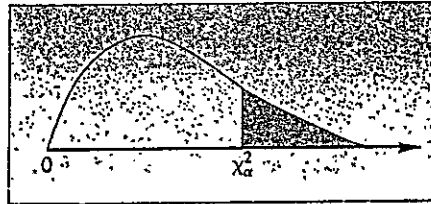
Degrees of Freedom	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
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
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576

Source: M. Merrington, "Table of Percentage Points of the t -Distribution," *Biometrika* 32 (1941), p. 300.
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Appendix C

TABLE 4 Critical Values of the Chi-Square Distribution



Degrees of Freedom	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$
1	0.0000393	0.0001571	0.0009821	0.0039321	0.0157908
2	0.0100251	0.0201007	0.0506356	0.102587	0.210720
3	0.0717212	0.114832	0.215795	0.351846	0.584375
4	0.206990	0.297110	0.484419	0.710721	1.063623
5	0.411740	0.554300	0.831211	1.145476	1.61031
6	0.675727	0.872085	1.237347	1.63539	2.20413
7	0.989265	1.239043	1.68987	2.16735	2.83311
8	1.344419	1.646482	2.17973	2.73264	3.48954
9	1.734926	2.087912	2.70039	3.32511	4.16816
10	2.15585	2.55821	3.24697	3.94030	4.86518
11	2.60321	3.05347	3.81575	4.57481	5.57779
12	3.07382	3.57056	4.40379	5.22603	6.30380
13	3.56503	4.10691	5.00874	5.89186	7.04150
14	4.07468	4.66043	5.62872	6.57063	7.78953
15	4.60094	5.22935	6.26214	7.26094	8.54675
16	5.14224	5.81221	6.90766	7.96164	9.31223
17	5.69724	6.40776	7.56418	8.67176	10.0852
18	6.26481	7.01491	8.23075	9.39046	10.8649
19	6.84398	7.63273	8.90655	10.1170	11.6509
20	7.43386	8.26040	9.59083	10.8508	12.4426
21	8.03366	8.89720	10.28293	11.5913	13.2396
22	8.64272	9.54249	10.9823	12.3380	14.0415
23	9.26042	10.19567	11.6885	13.0905	14.8479
24	9.88623	10.8564	12.4011	13.8484	15.6587
25	10.5197	11.5240	13.1197	14.6114	16.4734
26	11.1603	12.1981	13.8439	15.3791	17.2919
27	11.8076	12.8786	14.5733	16.1513	18.1138
28	12.4613	13.5648	15.3079	16.9279	18.9392
29	13.1211	14.2565	16.0471	17.7083	19.7677
30	13.7867	14.9535	16.7908	18.4926	20.5992
40	20.7065	22.1643	24.4331	26.5093	29.0505
50	27.9907	29.7067	32.3574	34.7642	37.6886
60	35.5346	37.4848	40.4817	43.1879	46.4589
70	43.2752	45.4418	48.7576	51.7393	55.3290
80	51.1720	53.5400	57.1532	60.3915	64.2778
90	59.1963	61.7541	65.6466	69.1260	73.2912
100	67.3276	70.0648	74.2219	77.9295	82.3581



Statistical Tables

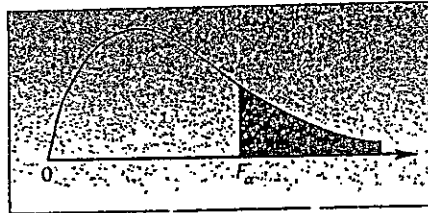
TABLE 4 (concluded) Critical Values of the Chi-Square Distribution

Degrees of Freedom	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	2.70554	3.84146	5.02389	6.63490	7.87944
2	4.60517	5.99147	7.37776	9.21034	10.5966
3	6.25139	7.81473	9.34840	11.3449	12.8381
4	7.77944	9.48773	11.1433	13.2767	14.8602
5	9.23635	11.0705	12.8325	15.0863	16.7496
6	10.6446	12.5916	14.4494	16.8119	18.5476
7	12.0170	14.0671	16.0128	18.4753	20.2777
8	13.3616	15.5073	17.5346	20.0902	21.9550
9	14.6837	16.9190	19.0228	21.6660	23.5893
10	15.9871	18.3070	20.4831	23.2093	25.1882
11	17.2750	19.6751	21.9200	24.7250	26.7569
12	18.5494	21.0261	23.3367	26.2170	28.2995
13	19.8119	22.3621	24.7356	27.6883	29.8194
14	21.0642	23.6848	26.1190	29.1413	31.3193
15	22.3072	24.9958	27.4884	30.5779	32.8013
16	23.5418	26.2962	28.8454	31.9999	34.2672
17	24.7690	27.5871	30.1910	33.4087	35.7185
18	25.9894	28.8693	31.5264	34.8053	37.1564
19	27.2036	30.1435	32.8523	36.1908	38.5822
20	28.4120	31.4104	34.1696	37.5662	39.9968
21	29.6151	32.6705	35.4789	38.9321	41.4010
22	30.8133	33.9244	36.7807	40.2894	42.7956
23	32.0069	35.1725	38.0757	41.6384	44.1813
24	33.1963	36.4151	39.3641	42.9798	45.5585
25	34.3816	37.6525	40.6465	44.3141	46.9278
26	35.5631	38.8852	41.9232	45.6417	48.2899
27	36.7412	40.1133	43.1944	46.9630	49.6449
28	37.9159	41.3372	44.4607	48.2782	50.9933
29	39.0875	42.5569	45.7222	49.5879	52.3356
30	40.2560	43.7729	46.9792	50.8922	53.6720
40	51.8050	55.7585	59.3417	63.6907	66.7659
50	63.1671	67.5048	71.4202	76.1539	79.4900
60	74.3970	79.0819	83.2976	88.3794	91.9517
70	85.5271	90.5312	95.0231	100.425	104.215
80	96.5782	101.879	106.629	112.329	116.321
90	107.565	113.145	118.136	124.116	128.299
100	118.498	124.342	129.561	135.807	140.169

Source: C. M. Thompson, "Tables of the Percentage Points of the χ^2 -Distribution," *Biometrika* 32 (1941), pp. 188-89. Reproduced by permission of the *Biometrika* Trustees.



TABLE 5 Critical Values of the F Distribution for $\alpha = 0.10$



Denominator Degrees of Freedom (k_2)	Numerator Degrees of Freedom (k_1)								
	1	2	3	4	5	6	7	8	9
1	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86
2	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38
3	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24
4	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94
5	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32
6	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96
7	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72
8	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56
9	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44
10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35
11	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27
12	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21
13	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16
14	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12
15	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09
16	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06
17	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03
18	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00
19	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98
20	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96
21	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95
22	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93
23	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92
24	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91
25	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89
26	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88
27	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91	1.87
28	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87
29	2.89	2.50	2.28	2.15	2.06	1.99	1.93	1.89	1.86
30	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85
40	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79
60	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74
120	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68
∞	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63

TABLE 5 (continued) Critical Values of the F Distribution for $\alpha = 0.05$

Denominator Degrees of Freedom (k_2)	Numerator Degrees of Freedom (k_1)									
	10	12	15	20	24	30	40	60	120	∞
1	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00



Choose a correct answer for each question. Two points for each question.

1. According to the theory of comparative advantage, specialization and free trade will benefit
(A) all trading parties under certain circumstances.
(B) all trading parties, even when some are absolutely more efficient producers than others.
(C) only that trading party that has an absolute advantage in the production of all goods.
(D) only that trading party that has a comparative advantage in the production of all goods.

2. A change in income, preferences, or prices of other goods or services leads to a _____ that causes a _____.
(A) change in demand; movement along the demand curve
(B) change in quantity demanded; movement along the demand curve
(C) change in demand; shift of the demand curve
(D) change in quantity demanded; shift of the demand curve

3. In college you practically existed on instant noodles, but now you earn \$95,000 a year. You never want to see instant noodles again. We can safely conclude that you consider instant noodles to be a(n)
(A) normal good.
(B) complementary good.
(C) luxury.
(D) inferior good.

4. A decrease in demand for cameras would likely be caused by
(A) an increase in the price of a substitute good.
(B) an increase in the price of cameras.
(C) an increase in the price of a complementary good.
(D) a decrease in the price of cameras.

5. If the market price of rice is \$5.00 per pound but the government will not allow rice farmers to charge more than \$1.00 per pound of rice, which of the following will happen?
(A) Demand must eventually decrease so that the market will come into equilibrium at a price of \$1.50.
(B) There will be a shortage of rice.
(C) Supply must eventually increase so that the market will come into equilibrium at a price of \$1.50.
(D) The market will be in equilibrium at a price of \$1.00.



6. Consumer surplus will be zero at any quantity if
- (A) supply is perfectly elastic.
 - (B) supply is perfectly inelastic.
 - (C) demand is perfectly elastic.
 - (D) demand is perfectly inelastic.
7. At a price of \$11, quantity demanded is 90; and at a price of \$9, quantity demanded is 110. Using the midpoint formula, the price elasticity of demand is
- (A) 0.0.
 - (B) 82.
 - (C) -1.0.
 - (D) -1.22.
8. The government is considering placing a tax on cigarettes to raise revenue to finance health care benefits. One of the arguments for this tax is that the demand for cigarettes is price inelastic. Which of the following statements is TRUE?
- (A) The tax on cigarettes may not raise as much revenue as anticipated in the years to come because the demand for cigarettes is likely to become more elastic over time.
 - (B) This is a very good way to raise revenue both in the short term and in the long term because there are no substitutes for cigarettes.
 - (C) This tax will not raise much revenue either in the short term or the long term because demand is price inelastic.
 - (D) No tax revenue can be raised in this way because sellers of cigarettes will just lower their price by the amount of the tax and therefore the price of cigarettes to consumers will not change.
9. Richard is consuming X and Y so that $MU_x/P_x = 6$ and $MU_y/P_y = 10$. To maximize utility, Richard should
- (A) continue to consume the same amount of X and Y, as the consumer is already maximizing utility.
 - (B) consume less of both X and Y.
 - (C) consume more X and less Y.
 - (D) consume less X and more Y.
10. Assuming that charitable giving is a normal good, the income effect of a decrease in personal tax rates should
- (A) lead to less giving because giving to charity would become more expensive relative to



- other goods.
- (B) lead to more giving because giving to charity would become less expensive relative to other goods.
- (C) lead to more giving because households would have more disposable income.
- (D) lead to less giving because households would spend that money on luxury goods
11. Assume leisure is an inferior good instead of a normal good. The income effect of a wage increase will lead to a _____ demand for leisure and a _____ labor supply.
- (A) lower; higher
- (B) higher; higher
- (C) lower; lower
- (D) higher; lower
12. You own a building that has four possible uses: a cafe, a craft store, a hardware store, and a bookstore. The value of the building in each use is \$2,000; \$3,000; \$4,000; and \$5,000, respectively. You decide to open a hardware store. The opportunity cost of using this building for a hardware store is
- (A) \$2,000, the value if the building is used as a cafe.
- (B) \$3,000, the value if the building is used as a craft store.
- (C) \$10,000, the sum of the values if the building is used for a cafe, a craft store, or a bookstore.
- (D) \$5,000, the value if the building is used for a bookstore.
13. Assume the wool industry is a perfectly competitive industry. The market demand curve for wool is _____ and each individual wool producer's demand curve is _____.
- (A) downward sloping; horizontal
- (B) horizontal; downward sloping
- (C) horizontal; horizontal
- (D) downward sloping; downward sloping
14. If a firm's demand curve is perfectly elastic, then at the profit maximizing level of output
- (A) $P = MR = MC$.
- (B) $P > MR > MC$.
- (C) $P < MR < MC$.
- (D) $P > 0$ and $MR = 0$.
15. Billy Bob's Fertilizer Engineers, a perfectly competitive firm, is incurring a loss but still



- earning an operating profit. Then in the short run this firm should _____ and in the long run, if there is no change in economic conditions, this firm should _____.
- (A) shut down; exit the industry
(B) shut down; expand
(C) produce where $MR = MC$; exit the industry
(D) produce where $MR = MC$; expand
16. Perfect price discrimination
- (A) is charging different prices to different buyers.
(B) is an attempt by monopolists to capture consumer surplus as profit.
(C) can eliminate the deadweight loss to society of a monopoly.
(D) do all of the above.
17. The pizza delivery industry is monopolistically competitive. Little Joe's Pizzeria raises its prices by 10%, but all the other pizzerias in town keep their prices the same. Which of the following is most likely to occur?
- (A) Little Joe's Pizzeria will not be able to sell any pizzas, because it was the only firm to raise its price.
(B) Little Joe's Pizzeria will lose some of its customers.
(C) Little Joe's Pizzeria's profits will increase.
(D) The number of customers served by Little Joe's Pizzeria will increase.
18. If a subsidy is granted to perfectly competitive firms that provide external benefits to society, the firm's marginal cost curve will shift _____ and the industry supply curve will shift to the _____.
- (A) down; left
(B) down; right
(C) up; right
(D) up; left
19. There would be no excess burden from a tax if demand were
- (A) unitarily elastic.
(B) perfectly elastic.
(C) perfectly inelastic.
(D) upward sloping.
20. Which of the following illustrates the principle of second best?
- (A) The government imposes taxes on gasoline and the tax revenue collected is used to pay



- for road repair.
- (B) The government decides to impose taxes on all grains, rather than imposing a tax only on wheat.
- (C) The government imposes a tax on a paper manufacturer that equals the cost of cleaning the river damaged by the waste discharged into the river by the paper manufacturer.
- (D) A tax imposed on land, because this tax distorts economic decisions less than taxes on other factors of production.
21. Suppose that the United States and Italy both produce wine and shoes. In the United States, wine sells for \$10 a bottle and shoes sell for \$40 a pair. In Italy, wine sells for 12,000 lira a bottle and shoes sell for 18,000 lira a pair. If the current exchange rate is 1,000 lira to the dollar, then
- (A) Italy will import both shoes and wine from the United States.
- (B) the United States will import both shoes and wine from Italy.
- (C) the United States will import shoes from Italy and Italy will import wine from the United States.
- (D) the United States will import wine from Italy and Italy will import shoes from the United States.
22. The demand curve faced by a monopolistic competitor is likely to be
- (A) less elastic than the demand curve faced by a perfectly competitive firm and less elastic than the demand curve faced by a monopoly.
- (B) less elastic than the demand curve faced by a perfectly competitive firm and more elastic than the demand curve faced by a monopoly.
- (C) more elastic than the demand curve faced by a perfectly competitive firm and less elastic than the demand curve faced by a monopoly.
- (D) more elastic than the demand curve faced by a perfectly competitive firm and more elastic than the demand curve faced by a monopoly.
23. If a firm's production process exhibits decreasing returns to scale for all levels of output, then the firm's long-run average cost curve will be
- (A) horizontal.
- (B) positively sloped.
- (C) negatively sloped.
- (D) U-shaped.
24. If the competitive firm suddenly notices that price exceeds marginal cost, the firm will
- (A) increase output.



- (B) decrease output.
- (C) be maximizing profits.
- (D) raise its price.

25. Which of the following statements about the short run is TRUE?

- (A) Labor may be the fixed factor.
- (B) In terms of chronological time, it could be as short as two weeks.
- (C) Firms can curtail operations but cannot go completely out of business.
- (D) All of the above

26. Which of the following will cause a rightward shift in the money demand curve?

- A. a reduction in income
- B. an increase in the money supply
- C. a reduction in the interest rate
- D. none of the above

27. Which of the following statements is consistent with a given (i.e., fixed) IS curve?

- A. A reduction in the interest rate causes investment spending to increase.
- B. An increase in government spending causes an increase in demand for goods.
- C. An increase in taxes causes a reduction in demand for goods.
- D. A reduction in the interest rate causes an increase in the money supply.

28. Suppose investment spending is NOT very sensitive to the interest rate. Given this information, we know that:

- A. the LM curve should be relatively steep.
- B. the LM curve should be relatively flat.
- C. the IS curve should be relatively steep.
- D. the IS curve should be relatively flat.

29. Suppose there is a central bank purchase of bonds and simultaneous tax cut. We know with certainty that this combination of policies must cause:

- A. an increase in the interest rate.
- B. a reduction in interest rate.
- C. an increase in output.
- D. a reduction in output.

30. Which of the following will occur if there is a reduction in consumer confidence?

- A. The LM curve will shift up.
- B. The IS curve will shift rightward.
- C. The IS curve will shift leftward.
- D. The LM curve will shift down.



31. Suppose fiscal policy makers implement a policy to reduce the size of a budget deficit. Based on the IS-LM model, we know with certainty that the following will occur in the short run as a result of this fiscal policy action.
- Investment spending will increase.
 - Investment spending will decrease.
 - There will be no change in investment spending.
 - Investment spending may increase, decrease, or not change.
32. Suppose the economy is operating at a point where output is less than the natural level of output. Which of the following statements is correct given this information?
- the price level is less than the expected price level
 - the unemployment rate is less than the natural unemployment rate
 - the price level will be higher next period than this period
 - all of the above
33. Which of the following would reduce the short-run output effects of a monetary expansion?
- The IS curve is very steep
 - a reduction in the interest rate sensitivity of investment
 - a reduction in the marginal propensity to consume
 - all of the above
34. Assume the economy is initially operating at the natural level of output. Now suppose a budget is passed that calls for a tax cut. This fiscal expansion will, in the *medium* run, have no effect on which of the following?
- the price level
 - the interest rate
 - employment
 - all of the above
35. Assume the economy is initially operating at the natural level of output. Suppose that individuals decide to increase their saving. We know that this increased desire to save will be "neutral" in:
- neither the medium run nor the short run.
 - both the short run and the medium run.
 - the short run, but not the medium run.
 - the medium run, but not the long run.
36. For this question, assume that the economy is initially operating at the natural level of output. A reduction in consumer confidence will cause:
- ambiguous effects on the real wage in the medium run.
 - no change in the real wage in the medium run.
 - an increase in the real wage in the medium run.
 - a reduction in the real wage in the medium run.
37. In the aggregate demand relation, a reduction in the price level causes output to increase because of its effect on:
- the expected price level.
 - the interest rate.
 - government spending.
 - firms' markup over labor costs.



38. Assume the economy is initially operating at the natural level of output. Which of the following events will initially cause a shift of the aggregate supply curve?
- an increase in the money supply
 - an increase in consumer confidence
 - an increase in government spending
 - none of the above
39. A reduction in the price of oil will tend to cause which of the following?
- no change in the interest rate in the medium run
 - an increase in investment in the medium run
 - an increase in the aggregate price level as output increases
 - no change in the real wage in the medium run
40. For this question, assume that the expected rate of inflation is a function of past year's inflation. Also assume that the unemployment rate has been equal to the natural rate of unemployment for a number of years. Given this information, we know that:
- the rate of inflation should neither increase nor decrease.
 - the rate of inflation will approximately be equal to zero.
 - the rate of inflation should steadily increase over time.
 - the rate of inflation should steadily decrease.
41. Which of the following would be most likely to cause a change in the natural rate of unemployment?
- changes in monetary policy
 - changes in the rate of inflation
 - changes in the price of oil
 - changes in fiscal policy
42. The "Lucas critique" is that:
- macro data based on government surveys is inaccurate.
 - policy changes affect expectations, which in turn affect the impact of the policy.
 - increasing unemployment to reduce inflation is more costly to society than economists traditionally think.
 - policy changes can affect the economy only when they are expected.
43. For this question, assume that there are decreasing returns to capital, decreasing returns to labor, and constant returns to scale. An increase in the capital stock will cause which of the following?
- not change in output
 - an increase in output per capita
 - a reduction in output
 - decrease the capital-labor ratio
44. Suppose there are two countries that are identical with the following exception. The saving rate in country A is greater than the saving rate in country B. Given this information, we know that in the long run:
- the capital-labor ratios will be the same in both countries.
 - the growth rate of output per capita will be the same in both countries.
 - the growth rate of output per capita will be greater in B than in A.
 - the growth rate of output per capita will be greater in A than in B.
45. "Convergence" has been occurring among the OECD countries because:
- the poorer countries have had higher growth rates than the richer ones.
 - the richer countries give away more of their output than the poorer ones.
 - the richer countries have had higher growth rates than the poorer ones.



- D. the procedures for measuring output per capita have been changing.
46. Suppose a recent budgetary policy results in a reduction in the national saving rate. Such a change in the saving rate will NOT affect which of the following variables in the long run?
- the level of investment
 - output per worker
 - capital per worker
 - none of the above
47. For this question assume that technological progress does not occur. In Japan, the rate of saving has generally been greater than in the U.S. Given this information, we know that in the long run:
- Capital per worker in Japan will be no different than U.S. capital per worker.
 - Japan's growth rate will be greater than the U.S. growth rate.
 - Output per worker in Japan will be greater than U.S. output per worker.
 - all of the above
48. Which of the following represents a dimension of technological progress?
- a larger variety of products
 - new products
 - larger quantities of output for given quantities of capital and labor
 - all of the above
49. Assume that the production function for an economy is represented by the following: $Y = N \cdot A$, where Y denotes the quantity of output, N denotes the number of workers, and A denotes the state of technology. Now assume the economy experiences an increase in productivity (i.e., an increase in A). This increase in productivity will cause:
- the aggregate supply curve to shift downward, and have an ambiguous effect on the aggregate demand curve.
 - the aggregate supply curve to shift downward and the aggregate demand curve to shift leftward.
 - the aggregate supply curve to shift downward and the aggregate demand curve to shift rightward.
 - the aggregate supply curve to shift upward, but has no effect on the aggregate demand curve.
50. Suppose workers' expectations of the price level and productivity are accurate. For this economy, an increase in productivity will cause which of the following?
- a decrease in the real wage and an increase in the natural rate of unemployment
 - an increase in the real wage and a decrease in the natural rate of unemployment
 - an increase in both the real wage and the natural rate of unemployment
 - none of the above



1. Evaluate the limit, if it exists:

$$(a) \lim_{x \rightarrow 0} \left(\frac{1}{\sin x} - \frac{1}{x} \right) \cdot (5\%) \quad (b) \lim_{x \rightarrow 0^+} \frac{\int_0^{\sqrt{x}} \sin(t^2) dt}{\sin(x^{3/2})}. \quad (5\%)$$

2. Find the equation of tangent to the curve of the graph of

$$8(x^2 + y^2)^2 = 100(x^2 - y^2) \text{ at the point } P(3, -1). \quad (10\%)$$

3. Evaluate the surface integral $\iint_G y^2 z^2 dS$, where G is the part of the cone

$$z = \sqrt{x^2 + y^2} \text{ between the planes } z = 1 \text{ and } z = 2. \quad (10\%)$$

4. A manufacturer of model airplane engines finds that it takes L units of labor and C units of capital to produce $f(L, C) = \beta + \frac{2}{3} \ln L + \frac{1}{3} \ln C$ units of the product. If a unit of labor cost \$100 and a unit of capital costs \$200 and \$150,000 is budgeted for production, determine how many units should be expended on labor and how many units should be expended on capital in order to maximize production. (10%)

5. Determine the radius of convergence and the interval of convergence of

$$\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{2k+1}. \text{ Moreover, find the sum of } 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots. \quad (10\%)$$

6. Evaluate $\lim_{n \rightarrow \infty} \left\{ \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n} \right\}$ (10%)

7. Find a polynomial f of lowest possible degree such that

$$f(x_1) = a_1, f(x_2) = a_2, f'(x_1) = b_1, f'(x_2) = b_2, \text{ where } x_1 \neq x_2, \text{ and } a_1, a_2, b_1, \text{ and } b_2 \text{ are given real numbers.} \quad (10\%)$$

8. The following functions F and G are defined for all real x by the equations given. Give the domain of composite function $G \circ F$ and a formula for

$$(G \circ F)(x). \quad F(x) = x + 5, \quad G(x) = \frac{|x|}{x}, \text{ if } x \neq 0, \quad G(0) = 1. \quad (10\%)$$

9. Let $f: S \rightarrow T$ be a function. If A and B are arbitrary subsets of S , prove that

$$f(A \cup B) = f(A) \cup f(B) \text{ and } f(A \cap B) \subseteq f(A) \cap f(B). \quad (10\%)$$

10. Prove that $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx = \frac{\pi}{4}$. (10%)