THE UNIVERSITY OF THE WEST INDIES
FIVE ISLANDS CAMPUS

Semester II

Examinations of APRIL/MAY 2023

Course Code:	**MGMT2020**
Course Title:	**Managerial Economics**
Date of Assessment:	**April 25, 2023**
Time:	**9:00 am**
Duration:	**Two (2) Hours**

INSTRUCTIONS TO CANDIDATES:

This paper has _4_ pages and _6_ questions.

YOU ARE REQUIRED TO ANSWER ___3___ QUESTIONS.

THIS ASSESSMENT IS WORTH ___60___ % OF YOUR FINAL GRADE.

ASSESSMENT DETAILS FROM INSTRUCTOR(S):

This paper has two sections. Section 1 is compulsory and is worth 30 Marks. Section 2 has five (5) questions of which you must answer any 2 questions. Each question in Section 2 is worth 25 marks

SECTION 1

You are required Answer all questions in this section which is worth 30 marks.

QUESTION 1

A. The total cost function for a monopolist is given by $\mathbf{TC = 3{,}000 + 145Q + 0.20Q^2}$ and the demand equation is $\mathbf{Q = 9{,}400 - 40P}$ per unit of output.

i. What is the profit maximizing level of output? **(5 marks)**

ii. Calculate the profit maximizing price. **(2 marks)**

iii. Calculate total profit at the profit maximizing level of output. **(3 marks)**

B. The price for product A for firm A in a perfectly competitive industry is **$100**. The total costs for firm A is given by $\mathbf{TC = 11{,}000 + 10Q + 0.15Q^2}$. Calculate the profit maximizing quantity for firm A. **(5 marks)**

C. The total cost function for a perfectly competitive firm is estimated to be $\mathbf{TC = 1{,}200 + 125Q - 12Q^2 + 0.04Q^3}$. The price of each device sold by the firm is **$125.**

i. Should the owner close down operations? Explain! **(5 marks)**

D. If the demand curve for a monopolistically competitive firm is $\mathbf{P = 30 - 0.0625Q}$, derive the following:

i. TR function **(3 marks)**

ii. MR function **(2 marks)**

iii. Revenue maximizing quantity **(3 marks)**

iv. Revenue maximizing price **(2 marks)**

SECTION 2: ANSWER ANY TWO (2) QUESTIONS FROM THIS SECTION.

Each question is worth 25 marks.

QUESTION 2

A. Explain the concept of elasticity and why it is critical in managerial economic decision making.

(5 marks)

B. The demand for Wilson tennis racquets, based on monthly data, has been estimated as follows:

$$Q_w = 470 - 6.8P_w - 5.4S_k + 1.3Y$$

where Q_w is the number of Wilson tennis racquets sold,

P_w = price per Wilson tennis racquet;

P_b = price per Babalot tennis racquet and

S_k = Tennis strings (Kevlar synthetic brand)

If P_w = \$175, S_k = \$60, Y = \$1,000 monthly income

i. What effect would an increase in the price of a Wilson racquet have on Total Revenue?

(4 marks)

ii. Compute the cross-price elasticity of demand for Babalot racquets and interpret your result

(4 marks

iii. Compute the income elasticity of demand and interpret your result **(4 marks)**

C. Assuming an output level of 15,000 and using the following cost function

$$TC = 2{,}500 + 35Q - 0.25Q^2 + 0.02Q^3$$

Where Q is output in thousands

Calculate the following:

i. The average total cost at this level of output **(3 marks)**

ii. The average variable cost at this level of output **(3 marks)**

iii. The average fixed costs at this level of output **(2 marks)**

QUESTION 3

Completely analyze the following demand equation for Vitz vehicles

$$Q_v = 9.6 - 0.86P_v - 2.78P_f + 3.15P_b + 0.54Y$$
$$(3.36) \quad (0.311) \quad (0.745) \quad (2.98) \quad (0.137)$$

$R^2 = 0.936$; Level of significance = 5%; n = 65;

figures in brackets are the standard errors

Where,

Q_v = The quantity of Vitz vehicles demanded;

P_v = The price of Vitz sedan vehicles;

P_f = The price of fuel;

P_b = The price of BMW sedan vehicles;

Y = The average household income (in thousands of dollars)

A. Interpret the estimated coefficients **(8 marks)**

B. Interpret whether each estimated coefficient, including the intercept, is statistically significant. Hence state which explanatory variables have any real effects on demand for Vitz sedan vehicles. *(T-Table is in the appendix)* **(12 marks)**

C. Determine the goodness of fit of the regression equation and evaluate your results. *(F-Table is in the appendix)* **(5 marks)**

QUESTION 4

A. Use one disequilibrium theory and one compensatory theory to explain why economic profits vary amongst firms? **(5 marks)**

B. Explain with examples, the three different forms of price discrimination. **(6 marks)**

4 If we were told that the estimated production function for particular vials of vaccine

$$Q = 3K^{0.8} L^{0.2}$$

Where Q = millions of vials of vaccine

K = units of capital (000)

L = person hours (000)

If the cost of labour (L) is $40 per person hours and capital (k) costs $25 per unit,

i. In what ratio must K and L be used in order to produce this brandy at the lowest possible cost **(12 marks)**

ii. Based on the results, which is more productive, labour or capital? **(1 mark)**

iii. Is the production process more labour or capital intensive? **(1 mark)**

QUESTION 5

A. Define the various types of oligopoly settings with which you are familiar in which managers make their price and output decisions. **(8 marks)**

B. Consider a two-firm duopoly facing a linear demand curve where:

$$P = \$2{,}250 - Q$$

Where P is price and Q is total output in the market (in thousands). For simplicity, also assume that both firms produce an identical product, have no fixed costs, and marginal cost MCx= MCy= $150.

i. Derive the output reaction curves for firms X and Y. **(8 marks)**

ii. Calculate the Cournot market equilibrium price and output solutions. **(7 marks)**

iii. Calculate the total revenue for firm X. **(2 marks)**

QUESTION 6

A firm manufactures two types of paint: emulsion and gloss. The profit contribution for each product is: $4 per emulsion and $6 per gloss. Both products are processed on the three machines: M1, M2 and M3. The time required for each product and the total time available per week on each machine is as follows:

Machine	Emulsion (hours)	Gloss (hours)	Available hours per week
Ml	2	2	22
M2	2	4	54
M3	4	10	180

A. Write down the objective function and all the constraints. **(5 marks)**

B. Write down the initial tableau required by the Simplex Method. **(5 marks)**

C. Use the Simplex Method, to solve the linear programming problem and interpret the solution values. **(15 marks)**

END OF QUESTION PAPER

Table T Critical Values of the *t* Distribution

df	One-Tail = .4 Two-Tail = .8	.25 .5	.1 .2	.05 .1	.025 .05	.01 .02	.005 .01	.0025 .005	.001 .002	.0005 .001
1	0.325	1.000	3.078	6.314	12.706	31.821	63.657	127.32	318.31	636.62
2	0.289	0.816	1.886	2.920	4.303	6.965	9.925	14.089	22.327	31.598
3	0.277	0.765	1.638	2.353	3.182	4.541	5.841	7.453	10.214	12.924
4	0.271	0.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	0.267	0.727	1.476	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	0.265	0.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	0.263	0.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	0.262	0.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	0.261	0.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	0.260	0.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	0.260	0.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	0.259	0.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	0.259	0.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	0.258	0.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	0.258	0.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	0.258	0.690	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	0.257	0.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	0.257	0.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	0.257	0.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	0.257	0.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	0.257	0.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	0.256	0.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	0.256	0.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.767
24	0.256	0.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	0.256	0.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	0.256	0.684	1.315	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	0.256	0.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	0.256	0.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	0.256	0.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	0.256	0.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	0.255	0.681	1.303	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	0.254	0.679	1.296	1.671	2.000	2.390	2.660	2.915	3.232	3.460
∞	0.254	0.677	1.282	1.645	1.960	2.326	2.576	2.807	3.090	3.291

Table A4: 5% Critical Values of the *F* Distribution

		Numerator Degrees of Freedom									
		1	2	3	4	5	6	7	8	9	10
Denominator Degrees of Freedom	10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
	11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85
	12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75
	13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67
	14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60
	15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54
	16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49
	17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45
	18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41
	19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38
	20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35
	21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32
	22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30
	23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27
	24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25
	25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24
	26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22
	27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20
	28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19
	29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18
	30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16
	40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08
	60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99
	90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94
	120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91
		3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83