Solution to Three Competition Problems

Quantity	Total Cost
0	11
1	22
2	26
3	36
4	52
5	75

Solution to Three Competition Problems

Did you work these problems before turning here?

Problem I

The Facts

- Three firms. Cost functions are as shown.
- Demand is

  $Q = 22.5 - 1.5P$
- Compute P, Q

Quantity	*Firm A*	*Firm B*	*Firm C*
1	1	1	1
2	3	4	2
3	6	8	4
4	10	13	7
5	15	19	11
6	21	26	16
7	28	34	22
8 and above	28 + 12 per unit	34+ 13.5 per unit	22+ 10.5 per unit

Marginal Cost

Quantity	*Firm A*	*Firm B*	*Firm C*
1	1	1	1
2	2	3	1
3	3	4	2
4	4	5	3
5	5	6	4
6	6	7	5
7	7	8	6

Problem I – Marginal Cost

Quantity	*Firm A*	*Firm B*	*Firm C*
1	1	1	1
2	2	3	1
3	3	4	2
4	4	5	3
5	5	6	4
6	6	7	5
7	7	8	6

Supply Functions

Price	Firm A	Firm B	Firm C	Total Supply
1	1	1	2	4
2	2	1	3	6
3	3	2	4	9
4	4	3	5	12
5	5	4	6	15
6	6	5	7	18
7	7	6	7	20

Supply and Demand

Price	Supply	Demand
1	4	21
2	6	19.5
3	9	18
4	12	16.5
5	15	15
6	18	13.5
7	20	12

Supply by Each Firm

Price	Firm A	Firm B	Firm C	Total Supply
1	1	1	2	4
2	2	1	3	6
3	3	2	4	9
4	4	3	5	12
5	5	4	6	15
6	6	5	7	18
7	7	6	7	20

Problem II

The Facts

- A new technology is about to reduce the cost of making the product to $10
- The cost structure for existing plants is as shown:

Quantity	Total Cost
0	11
1	22
2	26
3	36
4	52
5	75

The Facts

- 15,000 units of this product are sold annually. Each $1 drop in price would increase annual demand by 2,000 units.
- shown:

Quantity	Total Cost
0	11
1	22
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Questions

- What will be the price of the product when the new innovation comes on the market? What will be the total market when the new innovation comes on the market?
- Over time, current plants will wear out and leave the industry. When 3,000 remain, what will be the annual production using the new technology?

Finding Current Price

- Starting point is to find current price.
- From this table we know the minimum of the AC curve is at $12 with q = 3

Quantity	Total Cost
0	11
1	22
2	26
3	36
4	52
5	75

The Market

- Recall
  - 15,000 units of this product are sold annually. Each $1 drop in price would increase annual demand by 2,000 units.
  - What will be the price of the product when the new innovation comes on the market? What will be the total market when the new innovation comes on the market?
- The new price will be $10; Q = 19,000

Sales from New Plants

When 3,000 plants remain, what will be the annual production using the new technology.

Sales from New Plants

Existing plants will produce where MC = 10, at q =3.

using the new technology.

Quantity	Total Cost
0	11
1	22
2	26
3	36
4	52
5	75

Sales from New Plants

Existing plants will produce where MC = 10.

Total demand = 19000 → sales from new plants = 10,000.

Quantity	Total Cost
0	11
1	22
2	26
3	36
4	52
5	75

Problem III

The Basics

- Demand is
  Q = 3900 – 100P
- What level of output minimizes AC?
- What will be the price and total sales of widgets?
- How many plants ?

Quantity	Total Cost
1	33
2	42
3	54
4	78
5	105

Minimizing AC

What level of output minimizes AC

q= 3

Quantity	Total Cost
1	33
2	42
3	54
4	78
5	105

Determining Price

What level of output

What will be the price of widgets?

P = 18

Quantity	Total Cost
1	33
2	42
3	54
4	78
5	105

Sales

What level of output

What will be price of widgets?

P = 18

Total Sales

Q = 3900 – 100P

Q= 2100

Number of Plants

What level of output

What will be price of widgets?

P = 18

Total Sales

Q = 3900 – 100P

Plants

700=2100/3

End