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All mixed bundle results (except where noted) represent what I found as the optimal, instead of placing all work here and it being 15 pages, I condensed.

**Chapter 10 Problem Set**

1. **Locust Corp Transfer Pricing: monopoly situation with no market for upstream good**

MCp = 10

MCm = 4

P = 100 – 0.01Q

TR = 100Q – 0.01Q^2

MR = 100 – 0.02Q

1. **What is optimal output for Locust?**

100-0.02Q = 14

Q = 4300 units

1. **Optimal Price?**

100 – 0.01(4300) = $57

1. **How much is upstream good p priced at?**

This should be priced at MC = 10 to maximize profit

1. **Xerxes – Upstream product perfectly competitive**

Pm = 200 – 3Qm TRm = 200Q – 3Q^2m MRm = 200 – 6Qm

TCm = 100 + 15Qm MCm = 15

TCp = 5 + 3Qp + 0.4Q^2p MCp = 3 + 0.8Qp

1. **Optimal output for production division?**

Pu = MCu

20 = 3 + 0.8Qp

Qp = 21.25

1. **Optimal output for marketing? Downstream**

MCm(t) = 15 + 20 = 200 – 6Qm

Qm = 27.5

1. What is the optimal transfer price for the basic plastic item?

The optimal transfer price is the market price for the plastic item of 20 in a competitive market.

1. At what price should the marketing division sell its product?

**200 – 3(27.5) = 117.5**

1. **Country singer with two CDs with an MC of 4 each, bundle cost of 8**

|  |  |  |  |
| --- | --- | --- | --- |
| Class | CD1 | CD2 | Bundle |
| A | 11 | 5 | 16 |
| B | 8 | 9 | 17 |
| C | 9 | 10 | 19 |

*Pricing Separately:*

Optimal Price of 8 for CD 1 results in three units sold:

8\*3 – 4\*3 = 12 profit

Optimal price of CD2 of 9 results in two units sold:

9\*2 – 4\*2 = 10

Total profit = 22

*Pure Bundling:*

Optimal bundle price of 16 results in:

16\*3 – 8\*3 = 24 profit

*Mixed Bundling (optimal found):*

Since pure bundle optimal results in all buying bundle, try to remove A from bundle. Raise price to 17.

Bundle: 17\*2 – 8\*2 = 18 profit

Pricing A separately for CD 1: 11 – 4 = 7

Total profit from mixed bundling is 25

1. **What pricing method should they use?**

Mixed bundling

1. **How much better is mixed bundling?**

Results in a $1 increase over pure bundling, the second-best option.

1. **Consumer TVs and DVDs @ Bob and Ron’s**

|  |  |  |  |
| --- | --- | --- | --- |
| Class | TV | DVD | Bundle |
| A | 28 | 12 | 40 |
| B | 29 | 4 | 33 |
| C | 30 | 10 | 40 |

Item cost = 9 each, Bundle Cost = 18

*Separate Pricing*

TVs: 28 \* 3 – 9 \* 3 = profit of 57

DVDs: 12 \*1 – 8 \* 1 = profit of 3

Separate profit pricing of 60

*Pure Bundling*

33 \* 3 – 18 \* 3 = profit of 45

*Mixed Bundling (optimal case)*

Bundle @ 40 and separate price B. If we consider consumer surplus, by pricing TV products at 29, consumer C will drop out of the bundle and buy the TV separately because she gains 1 consumer surplus. She would rather earn surplus than take the bundle as is the definition of reservation price. We need to adjust our mixed bundle appropriately by reducing the bundle amount by 1 to keep C in the bundle and offset the additional surplus earned by pricing the TV lower than her reservation price.

We also bundle A in this scenario. Thus, our bundle would be (39 \* 2 – 18 \* 2) = 42 profit + single price for TVs for B of (29 – 9 )= 20 for a total profit of 62, which is higher than other bundling options.

*Mixed Bundle Option 2 with No Consumer Surplus*

Bundle both A and C at 40 and price TVs at 29 and DVD > 11.

Thus, profit from our mixed bundle:

40 \* 2 – 18 \* 2 = 44

Profit from single pricing B at 29 and excluding DVDs because they lose money:

29 – 9 = 20

Total profit from mixed bundle = 64, which is greater than all pure bundling and separate pricing. But this option does not consider impact to surplus, e.g. C dropping out when price gets reduced to 29 for TVs

**B. What is the difference from perfect price discrimination?**

Considering the company doesn’t sell product below cost, perfect price discrimination would result in profit of 64. If we do consider consumers surplus sensitive, then perfect price discrimination would be 2 better than the mixed bundle. All consumer surplus would be captured with pure bundling; however, profit would not be optimized.

There is no difference if we consider the surplus as a non-issue, all consumer surplus is captured because WTB is maxed out if we do not consider consumers as surplus sensitive above. However, they are normally surplus sensitive and their reservation prices represent indifference points between product and cash in hand.

**6. Basketball games: Kansas versus Nowhere, bundling problem**

**Cost of 5 per spectator, 10 bundle cost**

|  |  |  |  |
| --- | --- | --- | --- |
| Class | Kansas | Nowhere | Bundle |
| A | 40 | 13 | 53 |
| B | 49 | 3 | 52 |
| C | 3 | 30 | 33 |

*Separate pricing:*

Kansas: Price of 40 is optimal resulting in 40 \* 2 – 5 \*2 = 70

Nowhere: Price of 30 resulting in 30 \* 1 – 5 \*1 = 25

Total separate price profit of **95**

*Pure bundling*

Bundle price of 52 is optimal resulting in: 52 \* 2 – 10 \*2 = **84**

*Mixed bundling (optimal)*

Bundle price of 53, which prices out B and C, where we are LOSING money. We can single price these consumers to exclude the games we’re losing money. Therefore:

Bundle Contribution to profit: 53 \* 1 – 10 \* 1 = 43

Separate price for Kansas: 49 resulting in a profit of: 49 \* 1 – 5 \* 1 = 44

Separate price for Nowhere of 30 resulting in a profit of: 30 \* 1 – 5 \* 1 = 25

Total profit from mixed bundling is then **112** because consumers B and C cannot buy both individually (price is too high), and the bundle price is exceeds B and C’s reservation price.

1. **What’s your advice to the athletic director?**

Mixed bundle, you’ll maximize your profit at 112.

1. **What’s your advice worth to the athletic director?**

$17 in profit, the difference between mixed bundling (112) and separate pricing (95)

1. **GeeM sells wheels and interior packages, the cost of the wheels are 5, interior is 10, bundle is 15.**

|  |  |  |  |
| --- | --- | --- | --- |
| Class | Wheels | Interior | Bundle |
| A | 11 | 24 | 35 |
| B | 35 | 12 | 47 |
| C | 18 | 28 | 46 |

*Separate Pricing Strategy*

Wheels: Results in in an optimal price of 35 and a profit of 35 \* 1 – 5 \*1 = 30

Interior: Optimal price of 24 and a profit of 24 \* 2 – 10 \* 2 = 28

Total profit from separate price strategy: **58**

*Pure Bundle Strategy*

Results in an optimal bundle price of 46 and a profit of 46 \* 2 – 15 \* 2 = **62**

*Mixed Bundle Strategy (optimal)*

This mixed bundle strategy is more complex than others. Because A and B pay relatively little for the different packages (e.g. A pays the lowest for wheels and B pays the lowest for interior (12)), we choose a bundle price of 46 and work onward.

This means that we will attempt to separate price wheels. If we price wheels at 35, we price out both A and C to ensure we gain profit of 35 – 5 = 30 from B. If we try to price wheels at 11, we will actually lose money as C will exit the bundle and we’ll have to drop price for B, losing a large chunk of profit.

However, if we try and price A at 24, what we notice is that C values the interior good at 28. This price will pull C out of the bundle and earn C $4 in consumer surplus by purchasing interior at the lower price separately. C would rather have cash for the other items and will come out ahead in this scenario by $4, so we need C to stay in the bundle. Consumers are exactly indifferent between a good and the amount of the reservation price.

We need to adjust the price of our bundle to make up for the difference. We pull the bundle down to 42. However, we’ve created another problem: now B will come out of the single price situation because she has a 5 surplus as part of the bundle. We try this strategy anyway instead of dropping the price of wheels even further (ends up less profitable), since B is profitable for interior. We go ahead with bundling at 42, including B and C in the bundle and pricing the Interior at 24+ to isolate A. This means we don’t single price the wheels after all because B is more interested in a bundle priced at 42 because she earns $5 in surplus.

Therefore, we have a bundle of (42 \* 2) – (15 \* 2) = **54** + (24 – 10) = **14** for a profit of 68 in total under the mixed bundling strategy.

**Outcome:**

**GeeM’s max profit is 68 from the mixed bundle**, which is 6 better than the next best pure bundle strategy, therefore GeeM should price Interior at 24 and offer a bundle of 42 and not sell wheels separately to this customer base.

**8. Food for Life makes health foods. Three products: whey, strength bar, meal additive (sawdust – really?)**

Two types of consumers: A & B. Each product costs $3 to produce and $9 for bundle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class | Whey | Strength | Sawdust | Bundle |
| A | 10 | 16 | 2 | 28 |
| B | 3 | 10 | 13 | 26 |

*Separate Pricing Strategy*

Whey: Obvious optimal price is 10 for a profit of 10 - 3 = 7

Strength: Optimal price is 10 for a profit of 10\*2 – 3\*2 = 14

Sawdust: Obvious optimal price is 13 for a profit of 13-3 = 10

Total separate pricing profit: **31**

*Pure Bundle*

The optimal pure bundle is 26 for a profit of 26 \* 2 – 9 \* 2 = **34**

*Mixed Bundle (optimal)*

A bundled price of 26 results in 26 \* 1 – 9 \* 1 = **17 profit**

This leaves A with a surplus of 2, if we want to single price A, we need to make it up with Whey and Strength price differences. If we price whey down to 9- and strength to 15-, the surplus for the single priced items will be greater than the 26 bundle, enticing A away from the bundle.

Whey is priced at 9 – 3 = 6 profit

Strength is priced at 15 – 3 = 12 profit

**Total profit is maximized at 35 profit**

We don’t sell sawdust because we lose money so we price out

**Outcome:**

**Sell mixed bundle with Whey at 9, Strength at 15 (these prices can flex a bit) and the bundle itself at 26. Price sawdust high to avoid consumers dropping out of bundle. Do this because the mixed bundle is more profitable than any other option.**

**Option 2:** Another scenario: If we bundle A, in this case:

28 \* 1 – 9 \* 1 = 19 profit

Then, single pricing B:

B pays cost for Whey, so B is out

We can price sawdust at 13 resulting in a profit of 10 to bring us to 29 in profit

However, if we attempt to single price strength at 10, A will come out of the bundle to gain surplus of 6, resulting in a single price strategy. This strategy is not feasible. We have to account for the differences in surplus and how consumers will give up goods to get cash and surplus!! For instance, we cant assume pricing strength at 10 wont have an effect on consumer A.

Option 3: Consumers Don’t Care About Surplus

Price bundle @ 28

28 \* 1 – 9 \* 1 = 19

Single price strength at 10 and sawdust at 16 (really, who would pay 13 for sawdust?)

10 – 3 = 7

13 – 3 = 10

Price whey above 5. Profit for this option = 36 but it isn’t realistic. If we drop strength to 10, A will come out of bundle.