

2000 Sample Mid-Term Exam—Answer Sheet

1) True, False, Uncertain

1a) TRUE. Without a log calculator, this problem requires that you translate a percentage change in W to a percentage change in price, and then compare the resulting price change to the additional cost of \$ 5. The percentage change in weight W is

$$(9-10)/10 = -.10 = -10\%$$

This gives an (approximate) percentage change in price of

$$-.893 * -.1 = .0893 = 8.93 \%$$

or an overall (approximate) change in price of

$$.0893 * (\$ 59.95) = \$5.35$$

This is more than the cost of \$5 to change the weight, so the answer is TRUE, you should recommend this change.

Alternative 1: (Different Approximate Percentage Change) Suppose that you used a different base for the percentage change, namely

$$(9-10)/9 = -.1111 = -11.11\%$$

This gives an (approximate) percentage change in price of

$$-.893 * -.1111 = .0992 = 9.92 \%$$

or an overall (approximate) change in price of

$$.0992 * (\$ 59.95) = \$5.947$$

This is more than the cost of \$ 5 to change the weight, so the answer is TRUE, you should recommend this change.

Alternative 2: (Exact Solution) With a log calculator, you can directly compute

$$-.893 * (\ln 9 - \ln 10) = .0941 = 9.41 \%$$

We solve for the new price P^* as

$$\ln P^* - \ln 59.95 = .0941, \text{ or } P^* = \exp(.0941 + \ln(59.95)) = \$ 65.86$$

So the price change is \$ 65.86 – \$ 59.95 = \$ 5.91, which is greater than the cost of \$ 5 to change the weight, so the answer is TRUE, you should recommend this change.

1b) FALSE. When average cost increases with increased scale of production (of the same product, here aircraft), the process exhibits *diseconomies of scale*. Diseconomies of scope refer to when average cost increases with the number of different products produced by the firm.

1c) TRUE. Because the presence of the ferries makes it difficult to raise the price on the train-road link without substantial loss of business, ferries must be included in an accurate definition of the market for transit on this route from Sweden to Denmark.

1d) FALSE. The percentage of a tax that is passed through to consumers is given $E_s/(E_s - E_d)$. Here, the elasticity of demand *for the train-road link* is very high, because of the presence of the ferries as a close substitute. If the overall demand for transport on this route is inelastic, this situation would arise from a high cross elasticity of ferry travel with regard to the train-road link price.

2) Your answer must contain a clear definition:

Positive Network Externality: The product is more valuable to each consumer if greater quantity is sold in the market.

Your answer must then take a position, namely true or false, and argue the position. Here is an example of a full credit answer:

TRUE: The greater is the quantity sold of Playstation II's, the larger the market is for software/games for the Playstation II. Therefore, more software/games will be developed (as was the situation with Playstation I). Therefore, the greater is the market quantity, the more valuable (more available games, more options) is the Playstation II for each purchaser.

We have given partial credit to the answer

FALSE: People are just waiting for Playstation II because they perceive it to be a better product. Just because the advance marketing is extensive doesn't mean there is a network externality. It just means that Sony understands the success of Playstation I and wishes to inform all of their happy customers of the new Sony product.

3)

3a) Standard multi-plant monopoly picture (not included here; see recitation notes and/or lecture notes), MC2 lower than MC1; horizontal sum of MC's gives overall MC of production, which is matched to MR.

Yes, production does occur in Southeast Asia; $MC1 = MC2$ assures that all units with MC1 less than the current MC2 in Latin America will be produced. There is a positive number of those units at each level of MC2.

3b) $Q = 40,000 - 20,000 P$ implies that

$$P = (40,000/20,000) - (1/20,000) Q \quad \text{so that}$$

$$R = PQ = (40,000/20,000) Q - (1/20,000) Q^2, \text{ or}$$

$$MR = 2 - (1/10,000) Q$$

where Q is total $Q = Q_1 + Q_2$.

Optimal production implies $MC_1 = MC_2$, or

$$(1/10,000)Q_1 = (1/20,000) Q_2,$$

$$\text{so } Q_2 = 2 * Q_1$$

Now, solve by setting $MR = MC_1$, substituting $Q_2 = 2*Q_1$, as

$$2 - (1/10,000) (Q_1 + 2Q_1) = (1/10,000) Q_1$$

which gives $Q_1 = 5,000$ (Southeast Asia Production).

This gives $Q_2 = 10,000$ (Latin American Production)

Therefore $P = 1.25$ (Price) and

$$\text{Profits} = R - C_1 - C_2 = 18750 - 1250 - 2500 = 15000.$$

4.

4a) Competition:

$$\text{Demand is } P = 200 - 2Q \text{ or } Q = 100 - \frac{1}{2} P$$

Under competition, $P = MC$, so $P = 40$ cents.

For $P = 40$ cents/ride,

$$Q = 100 - \frac{1}{2} * 40, \text{ so } Q = 80 \text{ thousand rides}$$

Consumer surplus is $\frac{1}{2} * 80 * (200 - 40) = \frac{1}{2} * 1.60 * 80 \text{ thousand} = \64 thousand

Producer surplus is 0.

4b) Monopoly

$$TR = P * Q = (200 - 2Q) * Q = 200Q - 2Q^2$$

$$MR = 200 - 4Q$$

$$MR = MC \rightarrow 200 - 4Q = 40 \rightarrow 160 = 4Q \rightarrow Q = 40 \text{ thousand rides}$$

$$P = 200 - 2Q = 200 - 2 \cdot 40 = 120, \text{ or } \$1.20 \text{ per ride}$$

$$\text{Consumer surplus is now } \frac{1}{2} \cdot \$0.80 \cdot 40 \text{ thousand} = \$16 \text{ thousand}$$

$$\text{Producer surplus is } 40 \text{ thousand} \cdot \$0.80 = \$32 \text{ thousand (Trailaway Profit)}$$

$$\text{Deadweight loss is } \frac{1}{2} \cdot \$0.80 \cdot 40 \text{ thousand} = \$16 \text{ thousand}$$

4c) Subsidy, monopoly

Note that subsidy effectively changes MC to \$0.20. MR remains the same.

$$\text{MR} = \text{MC} \rightarrow 200 - 4Q = 20 \rightarrow 180 = 4Q \rightarrow Q = 45 \text{ thousand rides.}$$

$$P = 200 - 2Q = 200 - 2 \cdot 45 = 110, \text{ or } \$1.10 \text{ per ride}$$

$$\text{Producer surplus is } 45 \text{ thousand} \cdot \$0.90 = \$40.5 \text{ thousand (Trailaway Profit)}$$

$$\text{Subsidy cost is } 45 \text{ thousand} \cdot \$0.20 = \$9.0 \text{ thousand}$$

$$\text{Deadweight loss is } \frac{1}{2} \cdot (\$1.10 - \$0.40) \cdot 35 \text{ thousand} = \$12.25 \text{ thousand}$$

Aside: Providing the subsidy *decreases* dead-weight loss! Recall that, by selling less quantity than would be sold in a competitive market, a monopolist creates DWL. The subsidy gives the monopolist the incentive to offer more quantity than otherwise, thereby decreasing DWL. (More value is created by the additional trades than the cost of the program to the government.)