ECO 610-401 PROBLEM SET # 1 KEY

FALL 2002

1\. 6. a. If videos are given away ($P = \$0$), demand is predicted to be: $Q = 1600 - (200)(0) = 1{,}600$. At this output, firm A's cost is $1{,}200 + (2)(1{,}600) = \$4{,}400$, and firm B's cost is $(4)(1{,}600) = \$6{,}400$. Firm A is the cheaper option and should be chosen. (In fact, firm A is cheaper as long as $Q > 600$.)

b. To maximize profit, we simply set MR = MC for each supplier and compare the maximum profit attainable from each. We know that $MR = 8 - Q/100$ and the marginal costs are $MC_A = 2$ and $MC_B = 4$. Thus, for firm A, we find: $8 - Q_A/100 = 2$, and so $Q_A = 600$ and $P_A = \$5$ (from the price equation). For firm B, we find that $Q_B = 400$ and $P_B = \$6$. The station's profit is: $3{,}000 - [1{,}200 + (2)(600)] = \$600$ with firm A. Its profit is $2{,}400 - 1{,}600 = \$800$ with firm B. Thus, an order of 400 videos from firm B (priced at \$6 each) is optimal.

2\. 12. a. The MC per passenger is \$20. Setting MR = MC, we find $120 - .2Q = 20$, so $Q = 500$ passengers (carried by 5 planes). The fare is \$70 and the airline's weekly profit is $\$35{,}000 - 10{,}000 = \$25{,}000$.

b. If it carries the freight, the airline can fly only 4 passenger flights, or 400 passengers. At this lower volume of traffic, it can raise its ticket price to $P = \$80$. Its total revenue is $(80)(400) + 4{,}000 = \$36{,}000$. Since this is greater than its previous revenue (\$35,000) and its costs are the same, the airline should sign the freight agreement.

3\. 2. a. $Q = 180 - (1.5)(80) = 60$ pairs. $R = P \cdot Q = \$4{,}800$.

b. At P=\$100 and Q=30 pairs revenue falls to \$3000 per month.

c. $E_P = (dQ/dP)(P/Q)$. At $P = \$80$, $E_P = (-1.5)(80/60) = -2$;
At $P = \$100$, $E_P = (-1.5)(100/30) = -5$.
Demand is much more elastic at the higher price.

4\. b. Using the markup rule, we can see that with a price elasticity of -4 the profit-maximizing markup is 25%. And note that this only reflects short-term profit maximization. An even smaller markup may be optimal when one considers long-run demand. Thus the 50% markup goal was unrealitical and far from profit-maximizing.

5\. 14.a. Because demand conditions differ, the operator can profit from a policy of price discrimination. She faces a pure selling problem. To maximize weekday revenue (and profit) set $MR_d = 36 - .2Q_d = 0$ implying $Q_d = 180$ and $P_d = \$18$ per round. On weekends, we have $MR_w = 50 - Q_w/6 = 0$ implies $Q_w = 300$. But $Q_w = 240$ represents full capacity of the golf course. This is the best that the operator can do. The price is P=$30.

b. To deter defections (and preserve revenue), the operator should narrow the price gap: raise weekday prices and lower weekend prices slightly.

6\. (a) arc elasticity of demand: $\eta = [1000/(4000 + 5000)]/[1/(3 + 2)] = 5/9 = 0.555$.

(b) If total costs are the same, you should charge the higher price of $3. Total revenue increases when you raise price in an inelastic portion of the demand curve.

(c) If the income elasticity of demand is 0.5, then richer households spend a smaller proportion of their total income on video rentals than do poorer households. A $1 per unit tax on videos thus will proportionately fall more heavily on poorer households than richer households, and hence will be a regressive tax.

7\. Current markup = 15%

Hence MC must equal $1.70.

Optimal markup $\Rightarrow \frac{P - MC}{P} = -\frac{1}{E_p}$

$E_p = \frac{\% \Delta Q}{\% \Delta P} = \frac{+40\%}{-10\%} = -4$

Optimal markup thus is $\frac{P - MC}{P} = \frac{1}{4} = 25\%$

so the current markup of 15% is not enough.

In fact, the profit-maximizing price is

$P = \left(\frac{E_p}{1+E_p}\right) MC$

$P = \left(\frac{-4}{1-4}\right)(\$1.70) = \frac{4}{3}(1.70) = \$2.26$