Intermediate Microeconomics
Fall 2015

Problem Set 8
Due Lecture 10 in class on paper

1. GLS Chapter 8, Question 5

(a) Marginal revenue from selling another kitten is \$16. $MR = P = 16$.

(b) How many kitten should Josie sell to maximize profits? Josie should set $MR = MC$, which implies

$$\begin{aligned} MR &= MC \\ 16 &= 0.8Q \\ Q &= 16/0.8 \\ Q &= 20 \end{aligned}$$

Josie should sell 20 units.

How much profit does she make? Find total revenue first: $TR = PQ = 16(20) = 320$.

Find total cost. One way to find total cost is $TC = Q * ATC$, but we don't know ATC for this problem. Total cost is also the sum of all the marginal costs, and we do know that: $TC = 0.8(1) + 0.8(2) + \ldots + 0.8(20) = 0.8(1 + 2 + 3 + \ldots + 20) = 0.8(210) = 168$.

Profits are therefore $\pi = TR - TC = 320 - 168 = 152$.

(c) What are profits if Josie produces 21 kittens?

At $Q = 21$, calculate Josie's profits. Find total revenue first: $TR = PQ = 16(21) = 336$.

Find total cost. Total cost is also the sum of all the marginal costs: $TC = 0.8(1) + 0.8(2) + \ldots + 0.8(20) + 0.8(21) = 0.8(1 + 2 + 3 + \ldots + 21) = 0.8(231) = 184.8$.

Profits are therefore $\pi = TR - TC = 336 - 184.8 = 151.2$.

(d) How does the answer to (c) tell us that "bigger is not always better"?

At $Q = 20$, profits are higher than at $Q = 21$. (Revenues are higher at $Q = 21$, but costs are even higher.)

2. GLS Chapter 8, Question 10

(a) At $Q = 11$, $MR = MC$. What is profit? Note that at $Q = 11$, $MC = 7$.

$$\begin{aligned}
\pi &= TR - TC \\
&= MR * Q - ATC_{Q=11} * Q \\
&= MC * Q - ATC_{Q=11} * Q \\
&= 7(11) - 10.25(11) \\
&= -3.25(11) \\
&= -35.75
\end{aligned}$$

(b) Suppose that $Q = 0$. What are profits?

Profits are $\pi = TR - TC$. When $Q = 0$, $TR = 0$. Recall that total costs are $TC = FC + VC$. When the firm has no output, it also has no variable costs. So the only remaining cost is fixed costs.

At any level of output, $TC = ATC * Q = (FC + TVC)$. At $Q = 11$,

$$\begin{aligned}
ATC * Q &= (FC + TVC) \\
ATC * Q &= (FC + AVC * Q) \\
ATC_{Q=11} * Q &= (FC + AVC_{Q=11} * Q) \\
10.25(11) &= (FC + 7.5(11)) \\
10.25(11) - 7.5(11) &= FC \\
FC = 2.75(11) &= 30.25
\end{aligned}$$

At $Q = 0$, $\pi = -30.25$.

(c) At a price of \$7, should the firm produce 11 units or nothing at all? At price of \$9?

At a price of \$7, the firm loses less money if it produces nothing than if it produces 0. So the firm should produce nothing. Note that $AVC > MC$, so the firm should not produce in the short run. Surely, then, $ATC > MC$, so the firm should also not produce in the long run.

At a price of \$9, we see that the MC curve falls above the AVC curve and below the ATC curve. This means that the firm should produce in the short run ($MC > AVC$), but not in the long run ($MC < ATC$).

3. GLS Chapter 8, Question 11

(a) Diagram for marginal cost for each unit that Marty produces.

The picture here is a 45 degree line from the origin (points (0,0), (1,1), (2,2), (3,3), etc.).
(b) If the price is \$2, what is the profit maximizing quantity for Marty?

Marty (and all perfectly competitive firms) maximizes profits where $MR = MC$, or $2 = Q$.

(c) And for prices 3, 4, and 5? Same $Q = 2$, $Q = 3$, $Q = 4$, and $Q = 5$.

(d) This picture is the same as in (b).

(e) The supply curve for a competitive firm is its marginal cost curve, where that lies above the average variable cost. For Marty, that is all points.

4. Entry Over the Long Run

Use a few paragraphs to describe an industry that made positive economic profits over the short (or medium) run and where those profits were destroyed by entry. Alternatively, you can name a modern industry that you think is currently earning positive economic profits, and where entry is likely. I'll try to remember to share some good examples next class.