Econ 301
Deiter
R IC #11 (10 pts.)

Name Key

East question is worth 1 pt. unless otherwise noted.

1. Suppose a price-setting firm's TR = 40q - .4q^2 (q = output units). What are the equations of this firm's MR curve and demand curve (as functions of q on right hand side)?

MR = slope of TR = $dTR/dq = (1)(40)q^{1-1} - (2)(.4)q^{2-1} = 40 - .8q = MR$

D curve = $P = \frac{TR}{q} = \frac{40q - .4q^2}{q} = 40 - .4q = P$

2. For the firm in #1, TC = 250 + 8q. What is the equation of this firm's MC curve?

MC = slope of TC = $\frac{dTC}{dq} = (1)(8)(q^{1-1}) = 8 = MC$

3. (2 pts.) For the firm in #1 and #2 above, complete the table below:

	Q	P	TR	TC	Profit
a. The firm maximizes TR	50	20	1000	650	350
b. The firm maximizes profit	40	24	960	570	390

Max TR $\Rightarrow$ MR = 0 $\Rightarrow$ $40 - .8q = 0 \Rightarrow q = \frac{40}{.8} = 50$

Max $\pi \Rightarrow$ MR = MC $\Rightarrow$ $40 - .8q = 8 \Rightarrow .8q = 32 \Rightarrow q = 40$

4. For the firm in #1 and #2 above, find the breakeven level(s) of output.

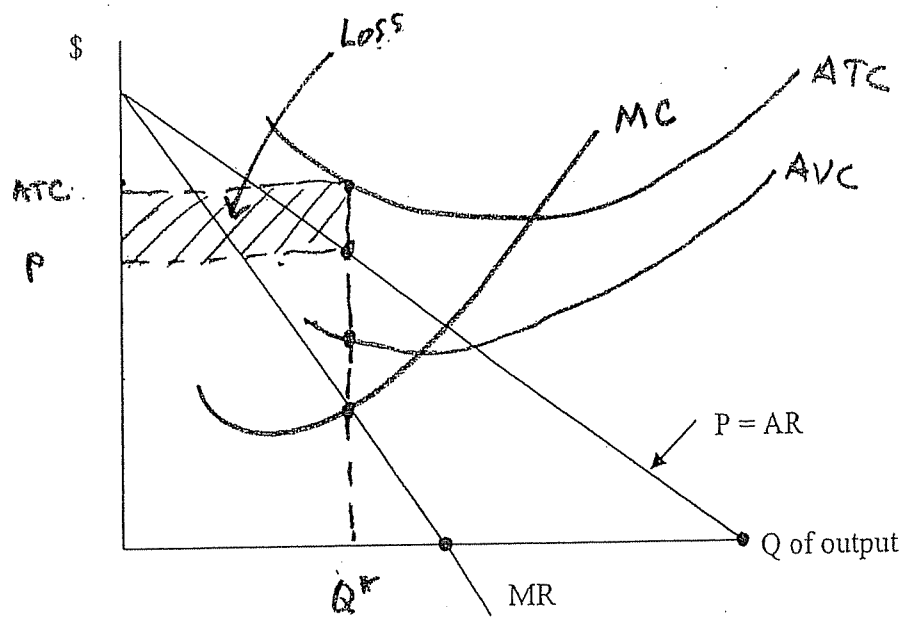
$\Rightarrow \pi = 0$
$\Rightarrow TC - TR = 0$
$\Rightarrow 250 + 8q - 40q + .4q^2 = 0$
$\Rightarrow .4q^2 - 32q + 250 = 0$

use quadratic formula
$q = \frac{-(-32) \pm \sqrt{(32)^2 - 4(.4)(250)}}{2(.4)}$
$= \frac{32 \pm 14.98}{.8} =$ 8.78 and 71.23

5. What is the breakeven price for a firm at q = 1000 if TVC = .001q^2 and TFC = 1000?

$\Rightarrow Pq - TVC - TFC = 0$
$\Rightarrow 1000P - (.001)(1000)^2 - 1000 = 0$
$\Rightarrow 1000P - 1000 - 1000 = 0 \Rightarrow P = \frac{2000}{1000} =$ 2.00

6. (2 pts.) In the graph below, draw and label U-shaped AVC, ATC, and MC curves. Draw these curves so they show the firm maximizing profit by producing in the short-run, yet still losing money. Show in the graph a) the profit-maximizing quantity of output (label Q*) and b) the firm's loss (label "loss").



Note: P > AVC
⇒ produce in SR

7. (2 pts.) Assume you have the following information for Agri Green:

Q_1 = current quantity sold (at P_1)
P_1 = current price changed for its product
ATC = current cost per unit to produce its product
= $.85P_1$
⇒ per unit profit margin = $P_1 - ATC = .15P_1$ (=15% of P_1)

Suppose management is considering reducing price by 10% so that
$P_2 = .9P_1$
Note ATC is unchanged = $.85P_1$
Q_2 = new quantity sold (at P_2)

a. What is the firm's current total profit equation as a function of P_1 and Q_1 and the firm's new profit equation as a function of P_1 and Q_2? (recall $P_2 = .9P_1$)?

$\pi_1 = P_1Q_1 - ATC(Q_1) = P_1Q_1 - .85P_1Q_1 = .15P_1Q_1 = \pi_1$
$\pi_2 = P_2Q_2 - ATC(Q_2) = (.9P_1)Q_2 - .85P_1Q_2 = .05P_1Q_2 = \pi_2$

b. How much larger than Q_1 would Q_2 have to be in order for Agri Green's profits with the new, lower price to be equal to current profits?

$\pi_1 = \pi_2 \Rightarrow .15P_1Q_1 = .05P_1Q_2$
$\Rightarrow .15Q_1 = .05Q_2 \Rightarrow Q_2 = \frac{.15Q_1}{.05} = 3Q_1 = 200\%$ greater