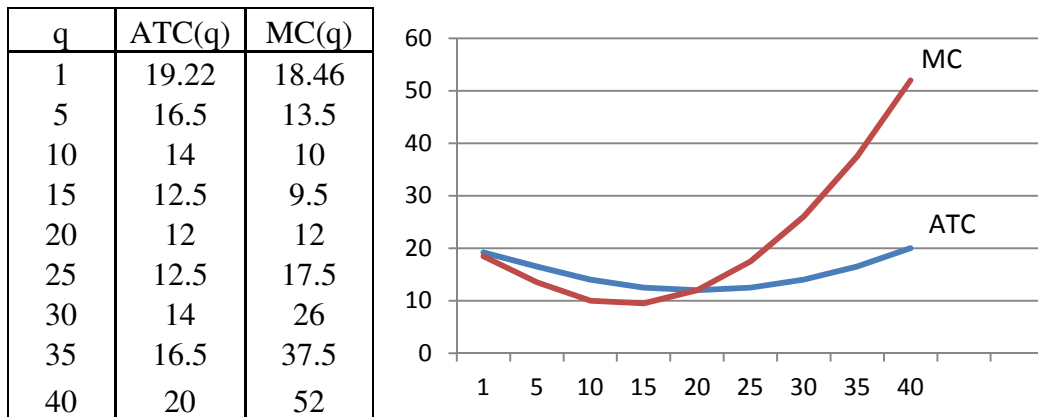


COMM 220 – PRACTICE PROBLEM SET 3 SOLUTIONS (Part I)

1. (a) Paul’s economic cost of buying the ticket = $99.50 + 2(20) = \$139.50$
 (b) Paul’s economic cost of attending the concert = $\$125 + 3(15) = \170

2. (a) $ATC(q) = C/q = 20 - 0.8q + 0.02q^2$
 $MC(q) = dC/dq = 20 - 1.6q + 0.06q^2$
 (b) ATC is minimized when $ATC=MC$
 $20 - 0.8q + 0.02q^2 = 20 - 1.6q + 0.06q^2$
 $q = 0.8/0.04 = 20$

(c) Graph of the ATC and MC curves using $q = 1, 5, 10, 15, 20, 25, 30, 35$ and 40 .



3. (a) $K = 10, q = 50L^{0.5}10^{0.5} \Rightarrow L^{0.5} = q/(50*10^{0.5}) \Rightarrow L = (q/(50*10^{0.5}))^2$
 (i) $TC(q) = 25L + 100*10 + 10q = 25(q/(50*10^{0.5}))^2 + 1000 + 10q$
 $= 1000 + 10q + 0.001q^2$
 $AC(q) = 1000/q + 10 + 0.001q$
 (ii) $q = 2000 = 50L^{0.5}10^{0.5}$
 $L = (2000/(50*10^{0.5}))^2 = 160$
 $AC(q=2000) = 1000/2000 + 10 + 0.001(2000) = \12.5

(b) Cost minimization occurs when $MRTS_{LK} = w/r$

$$(i) \quad MRTS_{LK} = MP_L/MP_K = 25L^{-0.5}K^{0.5}/25L^{0.5}K^{-0.5} = K/L$$

Optimal capital-labour ratio: $K/L = 25/100 = 1/4$ (i.e., $K = L/4$ or $L = 4K$)

$$(ii) \quad \text{Plug } L=4K \text{ into } q = 2000 = 50(4K)^{0.5}K^{0.5} \Rightarrow K = 20 \text{ and } L = 4(20) = 80$$

$$AC(q = 2000) = (25*80 + 100*20 + 10*2000)/2000 = \$12$$

(c) Cost minimization occurs when $MRTS_{LK} = w/r = 30/100$

Optimal capital-labour ratio: $K/L = 30/100 = 3/10$ (i.e., $K = 3L/10$ or $L = 10K/3$)

$$\text{Plug } L=10K/3 \text{ into } q = 2000 = 50(10K/3)^{0.5}K^{0.5}$$

$$\Rightarrow K = 21.9089 \text{ and } L = 10(21.9089)/3 = 73.0297$$

$$AC(q = 2000) = (30*73.0297 + 100*21.9089 + 10*2000)/2000 = \$12.19$$