Math 211 – 2015S – W7 – Tuesday Pg 1

Review

Inflection point – a point where graph changes concavity

Solve $f''(p) = 0$

Should check f'' changes sign at p.

Suffices to check $f'''(p) \neq 0$.

Global Min and Max

Max is a ~~~~ point P where f acheives is greatest value, not just near p but every where

Min is a point p where f acheives its least value.

Find critical points / compare critical values and values on endpoints or domain.

Always works when f defined on an interval [a, b] including endpoints.

Otherwise graph function to be sure there is a global min or max.

Profit Cost and Revenue

$$\pi(q) = R(q) - C(q)$$

A local or global max of profit can only occur at a critical point of the profit function or at an endpoint of the domain of definition

At a critical point of π

$$\pi'(q) = 0 \qquad MP = 0$$

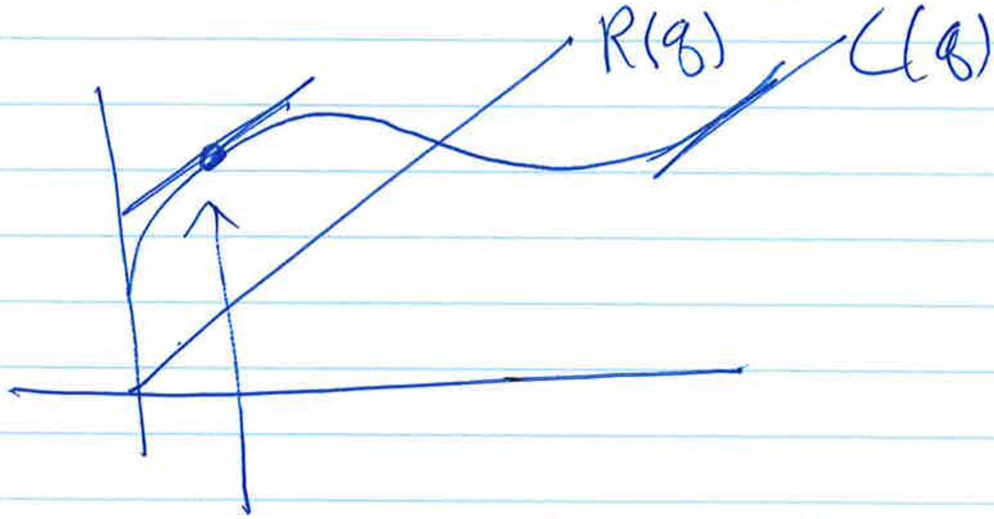
$$\pi'(q) = R'(q) - C'(q) = 0$$

$$R'(q) = C'(q)$$

$$\boxed{MR = MC}$$

If you plot R and C

then the critical points are where slopes of R and C are equal



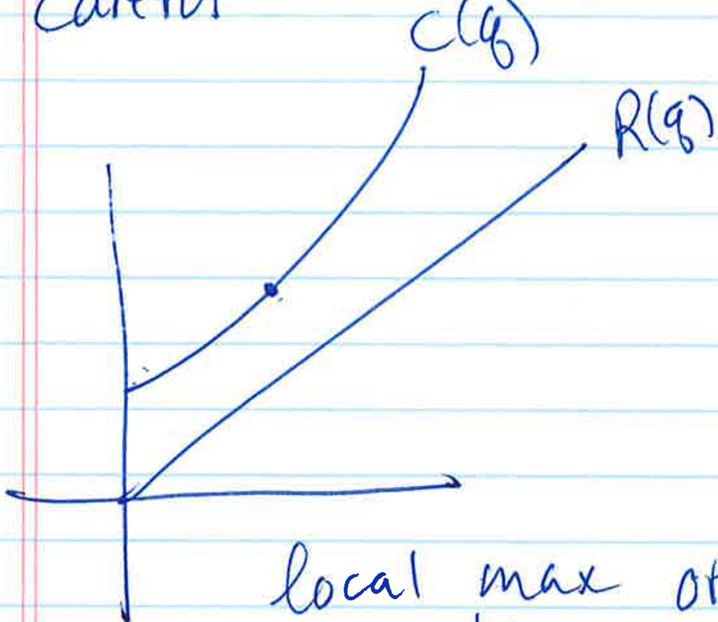
Cost greater than Revenue
loss

more loss then less loss
local min

gain — more gain then less gain

$\boxed{\text{local max}}$

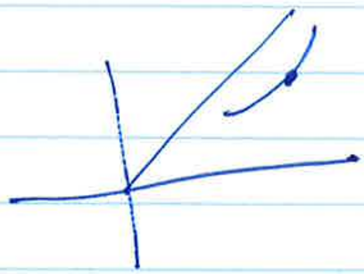
Careful



local max of profit function
but still a loss

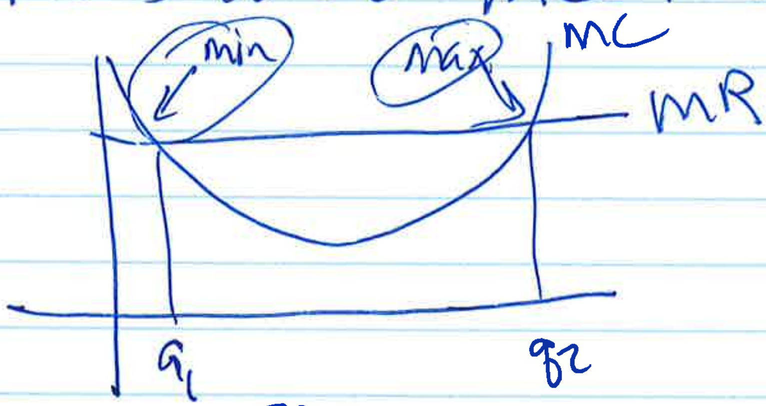
gain but local ~~max~~ min of profit
function

Want revenue above costs (gain)
and ~~the~~ at critical point the two curves are farthest away.



(~~gain~~ max)

If instead we plot MC and MR
Critical points are no longer points
Where slopes are equal, It is
points where MC intersects MR



$MP = MR - MC$

If $MR > MC$ profit increasing
$MC < MR$ profit decreasing

Use 1st deriv test, Cant tell if loss or gain from this plot

Maximizing Revenue

In some situations cost may not depend on quantity

Marginal cost ? $\boxed{0}$

Eg: Bus company with fixed schedule has same cost regardless of how many passengers.

$$M\pi = MR - MC$$

$$M\pi = MR$$

~~[illegible]~~ To maximize profit maximize revenue.

At a price of \$80 per half day a white water rafting company attracts 300 customers

Every \$5 decrease in price attracts an additional 30 customers

(a) Find demand equation —
recognize linear

$$q = mp + b$$

$$q = \frac{\Delta q}{\Delta p} p + q_0$$

$$\text{Slope} = \frac{-30}{5} = -6$$

$$q = -6p + q_0$$

$$300 = -6 \cdot 80 + q_0$$

$$q_0 = 780$$

$$\boxed{q = -6p + 780}$$

(b) Find revenue function

$$R = p \cdot q$$

$$= p \cdot (-6p + 780)$$

$$R(p) = -6p^2 + 780$$

(c) Maximize profit

$$R'(p) = -12p + 780$$

$$12p = 780$$

$$p = 65$$

(d) check Max because

$$R''(p) = -12$$

Concave down

max

\$65 price maximizes profit.