MATH 104 - 106

~~Wednesday~~ Tuesday November ~~23~~ 20

Profit function

A company is interested in estimating its profit for various demand levels.

special q where we have information

For a demand of 1000 units, the company is making a profit of $4000 and has a marginal profit of -0.5 $/unit.

$P(1000)$ $\quad$ $P'(1000)$

If one makes the assumption that the marginal profit remains constant, then the profit function would be linear. The equation of this line is:

$y = -0.5q + 4500$

from $y = mq + b$ take $m = -0.5$ use $y = 4000$ when $q = 1000$ solve b

$L_{1000}(q)$

emphasis special q value

for a demand q and a profit P. We call this the linearization of the profit for a demand of 1000 units.

or // $y = P(1000) + P'(1000)(q - 1000)$

For demand levels that are reasonably close to 1000 units, we can use the the above linearization to approximate the profit.

For example, if the ~~profit~~ demand increases by 50 units, then the profit will approximately be:

$P(1050) \approx L_{1000}(1050)$

actual profit

$= 4000 - 0.5(1050 - 1000)$

$= 3975$

And for a decrease of 30 units, the profit will approximately be:

$P(970) \approx L_{1000}(970)$

$= 4000 - 0.5(970 - 1000)$ $\quad$ $0.5(970 - 1000)$

General case

Given a differentiable function, we would like to estimate it at several points.

special x where we have info

For a given point *a* on the *x*-axis, the values of

$f(a)$ and $f'(a)$ are known.

If one makes the assumption that

slope of $f(x)$

remains constant

then the function would be linear. The equation of this line is:

$y = f(a) + f'(a)(x - a)$

$L_a(x) = f(a) + f'(a)(x - a)$

For x value close to a, we can use the line as an approximation for the

function value.

We write:

$f(x) \approx L_a(x)$

$f(x) \approx f(a) + f'(a)(x - a)$

The function $L_a(x)$ is called the

linearization of f at a

(near a?)