## ECONOMIC APPLICATIONS - SECTION 1.4

OBJECTIVES: INTERPRET LOST, REVENUE, AND PROFIT FUNCTIONS LAS WELL AS THEIR GRAPHS)

THE COST FUNCTION CLQ) GIVES THE COST OF PRODUCING THE QUANTITY & OF SOME 6000. DEFN IN GENERAL, COST OF PRODUCTION = VARIABLE COSTS FIXED COST THIS IS INCURRED EVEN IF NOTHING THIS DEPENDS ON IS PRODUCED. HOW MANY UNITS OF THE GOOD ARE PRODUCED. FOR A LINEAR COST THE VARIABLE COST FOR ONE ADDINONAL UNIT IS CALLED THE MARGINAL COST. FUNCTION, THIS 15 JUST THE SLOPE! CONGIDER ((q) = 24,000 + 79. (UNITS IN \$) → IT COSTS \$7 TO MAKE A NEW UNIT VAPIABL FIXED COST COST

DEFN THE <u>REVENUE FUNCTION</u> R(q) GIVES THE TOTAL REVENUE RECLEVED PROM SELLING A QUANTITY Q OF SOME 600D.

REVENUE = (PRICE I'M CHARGING/ITEM) · (# ITEMS SOLD)

USING OUR NOTATION ABOVE, R(q)=pg, WHERE p = PRICE YOU'RE SELLING EACH ITEM FOR

EX THE REVENUE FUNCTION RLG) & COST FUNCTION CLG) MODELING MOMO&CO'S FIRST YEAR OF PRODUCTION 15 SHOWN BELOW.



• WHEN DOES MOMO & CO BEGIN TO MAKE MONE Y?

• WHAT IS THE BREAK EVEN POINT? INTERPRET IT.



IN GENERAL ... COMPANIES WILL BE MAKING MONEY WHEN

## REVENUE > COST

<u>DEFN</u> <u>PROFIT</u> = REVENUE - COST. WELL DENOTE THE PROFIT FUNCTION BY USING OUR NOTATION, P(q) = R(q) - C(q). NOTE ALSO: <u>MARGINAL REVENUE</u> =

MARGINAL PROFIT

"Hi Noon Industries" Has cost & revenue functions (in dollars) Given by:

• FINO THE COST & REVENUE IF HI NOON Industries PRODULES 500 UNITS DOTHEY MAKE A PROFIT? WHAT ABOUT 5000 UNITS?

FOR 500 UNITS:

 $C(500) = 6000 + 10(500) = {}^{\$}11,000 \longrightarrow cost of producing 500 haves is $$11,000.$   $R(500) = 12(500) = {}^{\$}6000 \longrightarrow 1F company Produces 600 haves, Revenue is $6000.$ Since Profit = Revenue - Cost, P(500) = R(600) - C(500)

= 6000 - 11,000 = - \$5000 <0 => DOES NOT MAKE A PROFIT.

FOR 5000 UNITS:

(15000) = 6000 + 10(5000) = \$56,000 R(5000) = 12(5000) = \$60,000

P(5000) = R(5000) - C(5000) = 60,000 - 56000 = \$4000 >0 ⇒ DOES MAKE PROFIT!

IF WE'RE LOOKING AT P(g). P(q), HOW DO | FIND THE BREAK-EVEN





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## • WHAT IS THE MARGINAL COST? MARGINAL REVENUE? MARGINAL PROFIT?

## • WHAT IS THE BREAK-EVEN POINT FOR HI Noon Industries?

THE BREAK EVEN POINT WILL BE WHEN REVENUE = COST. WE'LL SET R(g) = C(g), THEN SOLVE FOR g TO FIND THE # OF ITEMS WHICH MUST BE PRODUCED IN ORDER TO BREAK EVEN.

$$R[q] = C[q] \rightarrow l_{2}q = 6000 + l_{0}q \qquad To BREAK EVEN, 
300 UNITS MUST
BE PRODUCED.
$$\frac{q}{2} = \frac{6000}{2} \Rightarrow \boxed{q-3000}$$
  
WHAPPY HOUND COFFEE COMPANY HAS THE FOLLOWING COST & REVENUE FUNCTIONS  
(IN DOLLARS) THAT MODEL THE COST & REVENUE OF PRODUCING & SELLING  
q BAGES OF DEC-THEMED COFFEE BEAN BLENDS.  

$$C(q) = q^{2} - 100q + 7500$$

$$R(q) = 75q$$
FIND THE BREAK EVEN POINTS).  
CAN YOU INTERPRET  
THE GRAPH OF THE  
PROFIT FUNCTION?  
AS BEFORE, THE BREAK EVEN POINT WILL BE WHEN  $R(q) = C(q)$ .  

$$R(q) = C(q) \quad LIVES:$$

$$75q = q^{2} - 100q + 7500 \longrightarrow NOW WE WANT TO SOLUE FOR q.
$$CAREFUL: THIS IS A QUADRATIC.'$$

$$q^{2} - 175q + 7500 = 0 \implies EITHER FACTOR OA HSE QUADRATIC FORMULA.$$
  
QUAD FORMULA: GIVEN  $ax^{2} + bx + c^{*0.1}$ 

$$q = \frac{175 \pm \sqrt{(-775)^{2} - 4(J)(MSCO)}}{2}$$
  
NOWE a ARE:  $a = 1, b \pm \sqrt{b^{2} - 4ac}$ 

$$q = \frac{175 \pm \sqrt{(-775)^{2} - 4(J)(MSCO)}}{2}$$$$$$