Proyecto de campo para Cálculo Diferencial

Cálculo diferencial
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UNIBE

"El Proyecto"

- La historia.
- Recopilación de datos.
  - Datos de compra y venta.
- Modelar funciones.
  - De costo, de beneficio, y demanda.
- Aplicar cálculos.
  - Maximizar beneficios.
  - Minimizar costos.
- Presentar resultados
  - Recomendaciones.
  - Retroamilemtación.

PRODUCT:
CHEESE WHEEL SPAGETTI

MOM'T
DON'T
GO

- Recolección de información

JANUARY	$10,896,506.67
FEBRUARY	$9,864,330.00
MARCH	$16,529,315.00
APRIL	$10,377,973.16
MAY	$13,038,479.07
AVERAGE	$12,141,320.78

CHEESE WHEEL SPAGETTI REVENUE	$50,468.00

PRICE-DEMAND & REVENUE

$$P = 1160 - 6.75x$$

$$R(X) = -6.75x^2 + 1160x$$

- **THE MATH…**

PROFIT FUNCTON

PROFIT = REVENUE - COST

$P(X) = (1160x - 6.75x^2) - (185x + 12080.62)$

$P(X) = -6.75x^2 + 975x - 12,080.62$

MAXIMUM

$P'(X) = -13.5x + 975$

$-13.5x + 975 = 0$
$-975 \quad -975$
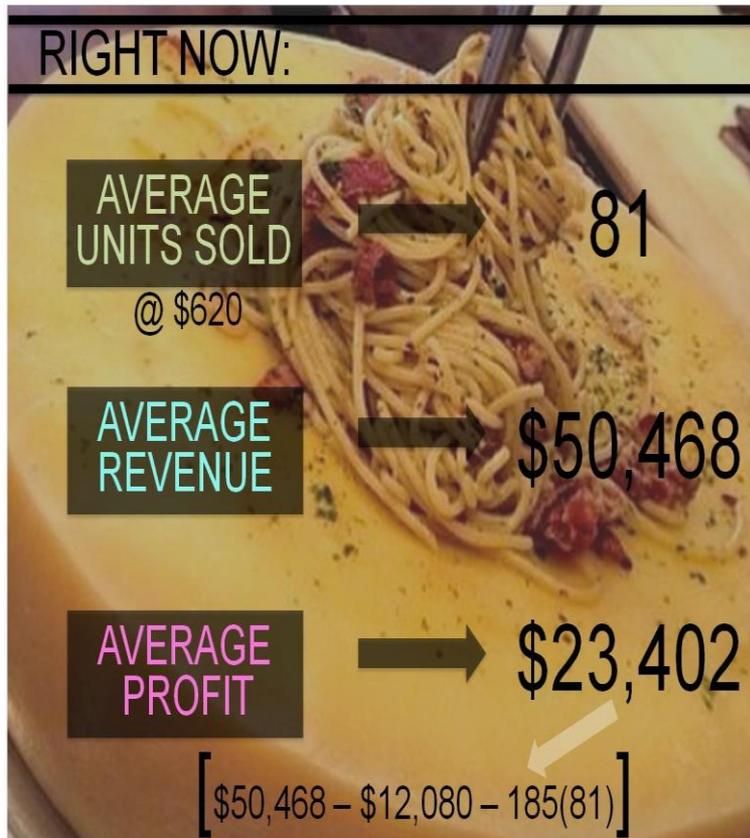$-13.5x = -975$
$-13.5 \quad -13.5$

$x = 72.2222222$

PLUG IN TO THE PRICE-DEMAND

$p = 1160 - 6.75(72.222)$

$p = \$672$

(SELLING THE PRODUCT AT $672 THEY WILL SELL 72 UNITS)
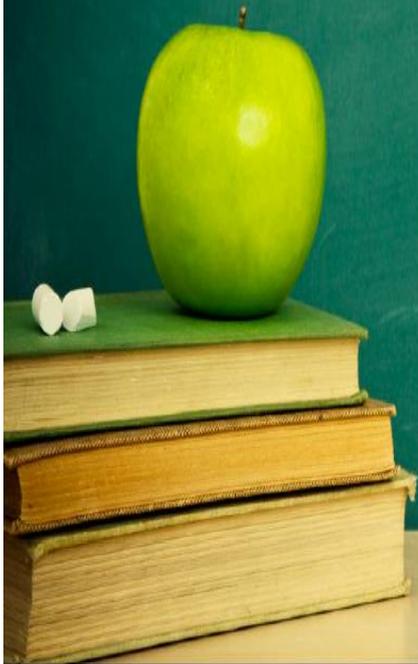
- Al momento:

Resultado del análisis:

RIGHT NOW:

AVERAGE UNITS SOLD → 81
@ $620

AVERAGE REVENUE → $50,468

AVERAGE PROFIT → $23,402

$[$50,468 - $12,080 - 185(81)]$

WITH OUR RECOMMENDATION:

AVERAGE UNITS SOLD → 72
@ $685

AVERAGE REVENUE → $49,320

AVERAGE PROFIT → $23,920

$[49,320 - [185(72) + 12,080]]$

- Conclusión

Melrose Public School

Company Overview

DATA OBTAINED

Annual Payment Per Student 2nd – 6th

School Year	Quantity of Students	Price
2007-2008	118	83,000
2008-2009	148	97,000
2009-2010	142	110,000
2010-2011	150	$134,250
2011-2012	158	$146,250
2012-2013	159	$156,900
2013-2014	198	$181,000

- Cálculos

FINDING THE REVENUE FUNCTION

$R(X) = D(X) \cdot X$ ← *Formula*

Final Equation

$$R(X) = -1.96X^4 + 556.458X^3 + (-83134.539X^2) + 4110272.592X$$

Formula

$$P(X) = \left[R(X) - C(X) \right]$$

Copy each formula, then solve

$$P(X) = -1.96X^4 + 556.458X^3 + (-83134.539X^2) + 4110272.592X \cdot$$
$$(-950171.26572 + 133595.62765149\,X)$$

$$P(X) = -1.96X^4 + 556.458X^3 - 83,134.5X^2 + 3.976 \cdot 10^6 X + 950,171$$

In order to find our maximum we find the derivative of our profit function and graph it

$$P'(X) = -4.784X^3 + 1669.37X^2 - 166269X + 3.97668 \cdot 10^6$$

MAXIMUM $X = 160$

$$P'(160) = -4.784(160)^3 + 1669.37(160)^2 - 166269(160) + 3.97668 \cdot 10^6$$

$$P'(160) = \$\,514,368$$

COST EQUATION

$$C(160) = -950171.26572 + 133595.62765149(160)$$
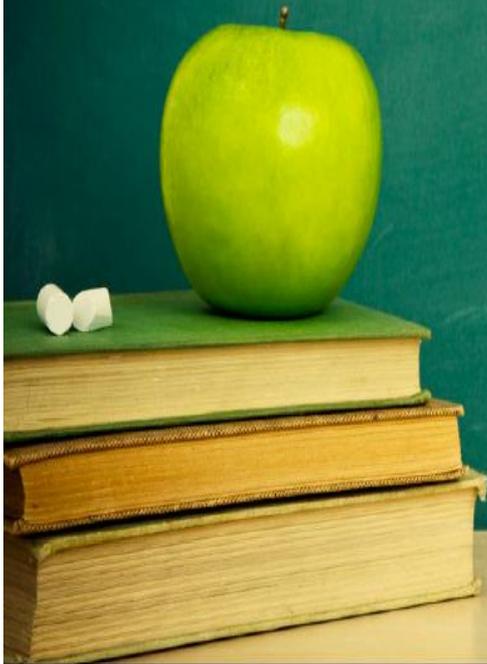$$C(160) = 20,425,130.16$$

PROFIT EQUATION

$$P(160) = 24,808,161.6 - 20,425,130.16$$
$$P(160) = 4,383,031.44$$

Melrose Public School
Company Overview

RECOMMENDATION

WE RECOMMEND THAT IN ORDER TO MAXIMIZE THE PROFIT OF YOUR SCHOOL BETWEEN 2ND GRADE AND 6TH GRADE, YOU SHOULD HAVE 160 STUDENTS, EACH PAYING $155,051.01 PER YEAR. THIS WOULD HELP YOU ACHIEVE YOUR MAXIMUM PROFIT WHICH IS $4,383,031.44.

ANSWER

After giving our recommendation to the owner of the school Maria ▮▮▮▮▮▮ she told us that she was going to do a more in depth analysis of our project with her accountant and not only analyze the amount of student needed to achieve the maximum profit from 2nd to 6th grade but from the entire school. She also said that if the information was accurate, through time she was going to take measure to decrease the amount the student and decrease the price of the year to achieve the maximum profit.

She expressed her gratitude to the professor for the amazing and interesting project that we were developing. ☺

- 3 little Steps S.R.L.

Obtaining Data

We decided to do the analysis based on years 2012 and 2013, dividing each year in 4 quarters.

We obtain the following data:

.Amount Bought in each quarter

.Price of each unit bought and the total amount

.Amount Sold each quarter

.Sale price and the total amount.

.Cost Function

.Revenue

.Profit

- Resultados no esperados:

Finding My Profit

- 2012
  Total Cost for the year: $3,726,011
  Total Revenue: 3,363,0000
  Net Loss: **$-363,011**

- 2013
  Total Cost for the year: $3,799,112
  Total Revenue: $3,460,000
  Net Loss: **$-339,112**

- The results:

Why would a company keep selling a product that generated no profit?

- According to the owner, the product has always been on sale, something that we didn't know while doing this project. They stated that they kept selling this product in order to **attract and retain clients.**

- According to the sales department, an 80% of the clients that bought this product are actual clients that bought other products and used our company Technical Support, which generated profit for the company.

- Testimonio
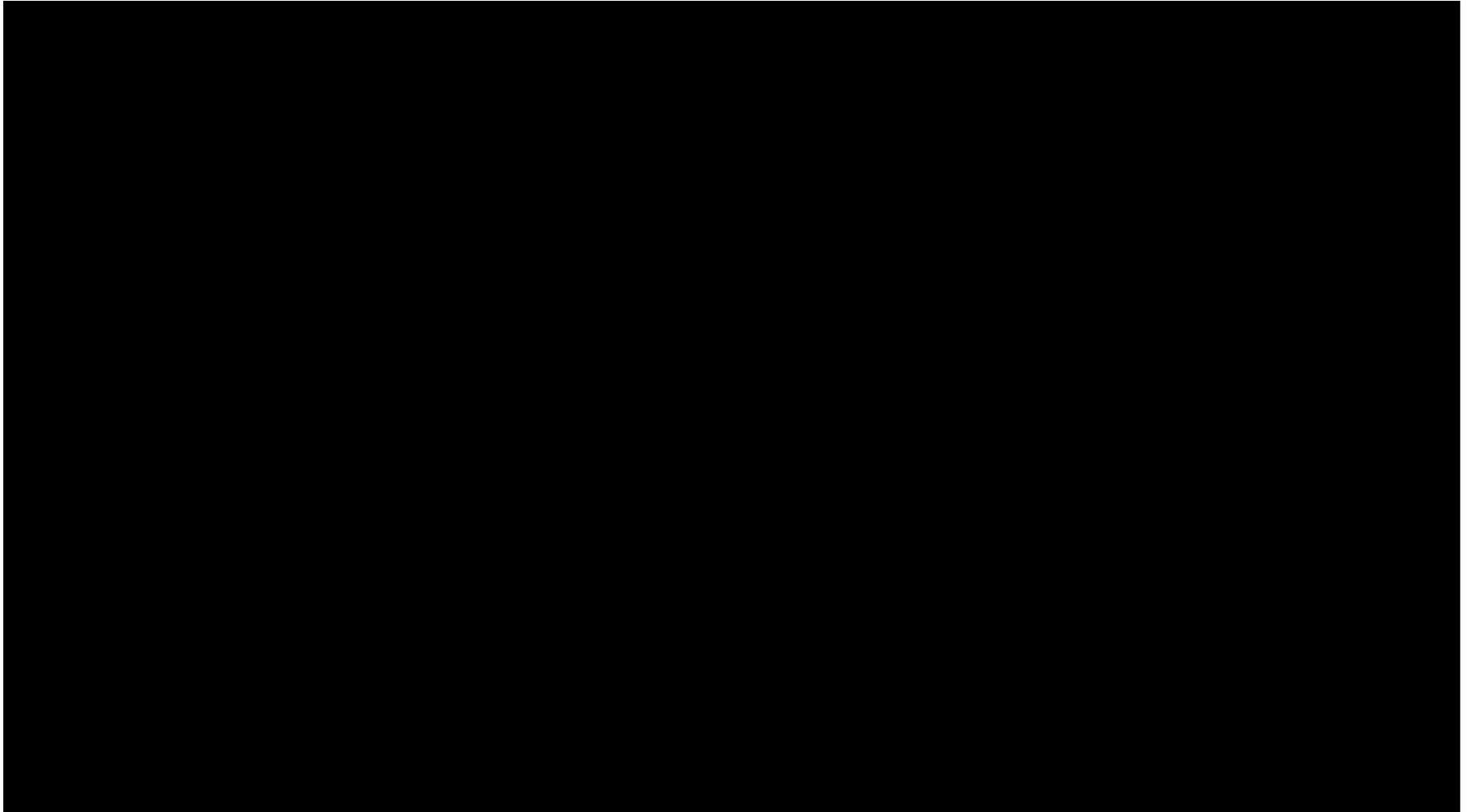
Muchas gracias

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SANTO DOMINGO, D.N.
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