

Derivada es un cambio

Regla de la potencia

Si  $f(x) = x^n$  entonces  $f'(x) = n \cdot x^{n-1}$

Ej 1 = Deriva  $f(x) = x^5$   
 $f'(x) = 5x^4$

Ejem 2 = Deriva  $f(x) = 3x^7$   
 $f'(x) = 21x^6$

Regla constante

Si  $f(x) = c$ , donde  $c$  es una constante, entonces  
 $f'(x) = 0$ .

Ejem 1 = Deriva  $f(x) = 7$   
 $f'(x) = 0$

Ejem 2 = Deriva  $f(x) = -3$   
 $f'(x) = 0$

Regla de la suma.

Si  $f(x) = g(x) + h(x)$  Entonces  $\begin{cases} f'(x) = g'(x) + h'(x) \end{cases}$

Ejem 1 = Derivada  $f(x) = x^2 \cdot \sin(x)$   
 $f'(x) = 2x \cdot \sin(x) + x^2 \cos(x)$

Ejem 2 = Deriva  $f(x) = (2x+1) \cdot e^x$   
 $f'(x) = 2 \cdot e^x + (2x+1) \cdot e^x$   
 $f'(x) = 2e^x + 2xe^x + 1e^x$   
 $f'(x) = 3e^x + 2xe^x$

$F(x) = -x^2 \rightarrow y = f(x)$   
 ①  $F' \vee F''$   
 $- F'(x) = -2x$   
 $F''(x) = -2$

②  $F'(x) = 0 \rightarrow c = (\check{x}; \check{y})$   
 $-2 \cdot x = 0$   
 $x = 0 / -2$   
 $x = 0$   
 $F(0) = -(0)^2$   
 $F(0) = 0$   
 $y = 0$   
 $C = (0, 0)$  Max

③  $F''(x) = 0 \rightarrow P.I = 0$   
 $F''(x) > 0 \rightarrow P.min = +$   
 $F''(x) < 0 \rightarrow P.max = -$   
 $F''(x) = -2$   
 $F''(0) = -2$

$F(x) = 2x^3 - 4x^2$   
 ①  $F'(x) = 6x^2 - 8x$   
 $F''(x) = 12x - 8$   
 $\Delta \vee x$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

②  $F'(x) = 0 \rightarrow ? = c \rightarrow c = \left( \frac{4}{3}, \frac{64}{27} \right) P.min$   
 $6x^2 - 8x = 0$   
 $x(6x - 8) = 0 \rightarrow x = 0$   
 $6x - 8 = 0$   
 $6x = 8$   
 $x = \frac{8}{6} = \frac{4}{3}$   
 $F(\frac{4}{3}) = 2(\frac{4}{3})^3 - 4(\frac{4}{3})^2$   
 $F(\frac{4}{3}) = 2 \cdot \frac{64}{27} - 4 \cdot \frac{16}{9}$   
 $F(\frac{4}{3}) = \frac{128}{27} - \frac{64}{9} = \frac{128}{27} - \frac{256}{27} = -\frac{128}{27}$   
 $= -\frac{64}{27} = y$



$f'(0) = 12 \times -8$   
 $f'(4/3) = 12(4/3) - 8$   
 $f'(4/3) = \frac{4}{1} \cdot \frac{2}{3} \cdot \frac{4}{3} = -8$   
 $f''(4/3) = 16 - 8 = 8 \text{ min}$

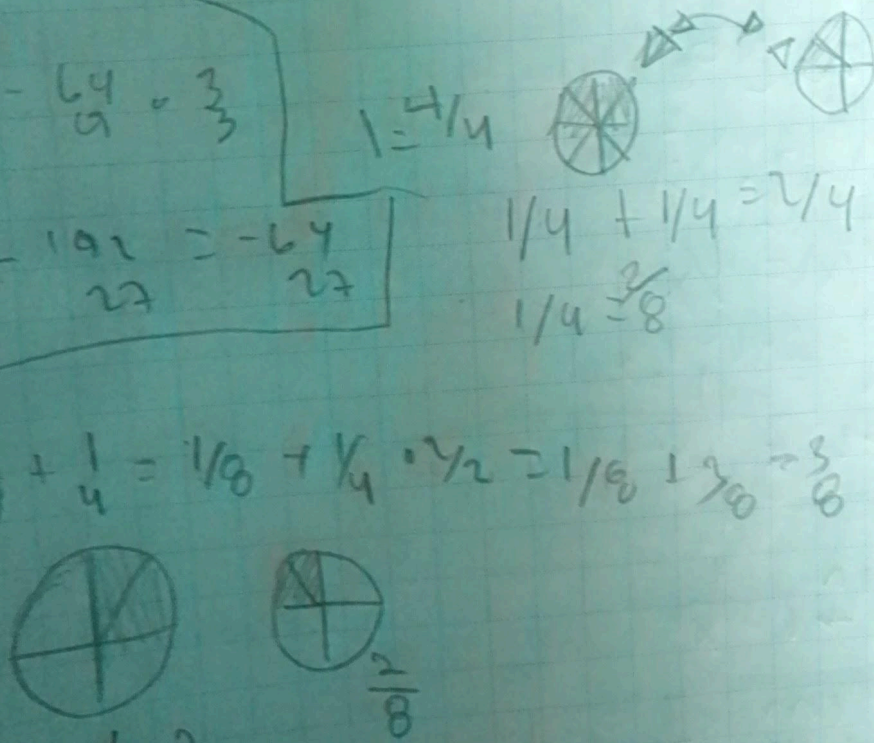
$C = (0, 6) \rightarrow \text{Máx}$   
 $F(0) = 2(0)^3 - 4(0)^2$   
 $F(0) = 0$   
 $f''(0) = 12(0) - 8$   
 $f''(0) = -8 \text{ Máx}$

$\frac{m_8}{22} = \frac{64}{9} = \frac{3}{3}$   
 $1 = 4/4$   
 $128 - 192 = -64$   
 $22 \quad 22 \quad 22$

$1 = 8/8$   
 $1/4 + 1/4 = 2/4$   
 $1/4 = \frac{2}{8}$

$\frac{1}{8} + \frac{1}{4} = 1/8 + 1/4 \cdot 2/2 = 1/8 + 2/8 = 3/8$

$4/4$   
 $\frac{1}{4} \cdot \frac{2}{2}$   
 $2/8$



$$\begin{aligned}
 \frac{5}{3} - \frac{4}{7} &= \frac{20}{21} + \frac{1}{21} = \frac{21}{21} = 1 \\
 \frac{1}{2} + \frac{3}{4} &= \frac{2}{4} + \frac{3}{4} = \frac{5}{4} \\
 \lim_{x \rightarrow 0} [30] &= 30 \\
 f(x) = \ln(x) & \quad g(x) = x-1 \\
 f'(x) = \frac{1}{x} & \quad g'(x) = 1 \\
 \lim_{x \rightarrow 1} \frac{f(x)}{g(x)} &= \frac{1}{1} = 1 \\
 \lim_{x \rightarrow 1} \frac{f'(x)}{g'(x)} &= \frac{1}{1} = 1
 \end{aligned}$$



$$g(x) = \sin 3x$$
$$g'(x) = 3 \cos(3x)$$

$$g(x) = x - \frac{3}{2} \sin(2x)$$

$$g'(x) = 1 - \frac{3}{2} \cos(2x)$$

$$g''(x) = 1 - 3 \cos(2x)$$

$$\begin{aligned}
 a^0 &= 1 & a^+ &= a & a^n \cdot a^m &= a^{n+m} \\
 \frac{a^n}{a^m} &= a^{n-m} & \left(\frac{a}{b}\right)^n &= \frac{a^n}{b^n} & a^{-n} &= \frac{1}{a^n} \\
 (a^n)^m &= a^{n \cdot m} & \sqrt[m]{a^n} &= a^{n/m} \\
 a^n &= \frac{1}{a^{-n}} & \left(\frac{a}{b}\right)^{-n} &= \left(\frac{b}{a}\right)^n
 \end{aligned}$$

UTEQ #un legado transformador



$V = 252 \text{ m}^3$   
 $F=0 = 5 \cdot x^2$   
 $T=0 = 2,5 \cdot x^2$   
 $Z=0 = 3,5 \cdot 4xy$   
 $F(x) = 5 \cdot x^2 + 2,5 \cdot x^2 + 14xy$   
 $F(x) = 7,5x^2 + 14x \left( \frac{252}{x^2} \right)$   
 $F(x) = 7,5x^2 + \frac{3528}{x}$   
 $F'(x) = 15x + \left( \frac{3528}{x^2} \right)$   
 $F'(x) = -\frac{3528}{x^2} + 15x$



$$A-7 \quad \begin{array}{l} X^2 - 25 \\ Y - 252 \\ \hline \end{array}$$

$$-3528 + 15 = 0$$

$$-3528 = -15X$$

$$X^2 = 15$$

$$X = \pm \sqrt{15}$$

$$X = 117$$

$$X = 617$$

$$f(x) = 7,5x^2 + 3528$$

$$f(6,17) = 7,5 \times 6,17^2 + 3528$$

$$f(6,17) = 756,17^2 + 3528$$

$$f(6,17) = 285,17 + 3528$$

$$f(6,17) = 3813,17$$

$$Y = 15^2$$

$$Y = 225$$

Handwritten mathematical work on grid paper, showing the derivation of a power law function  $b(x)$  and its derivative  $b'(x)$ .

**Table:**

x	y
1	3528
2	1764
3	1176
4	882
5	705.6
6	588
7	504
8	441
9	392
10	352.8

**Calculations:**

$y = 252$   
 $\bar{x}^2$

$y = 252$   
 $(6, 17)^2$

$y = 6.61$

**Derivation of  $b(x)$ :**

$b(x) = 3528 \cdot x^{-1}$

$b'(x) = -3528 \cdot x^{-2}$

**Derivation of  $b'(x)$ :**

$b'(x) = -3528 \cdot x^{-2}$