# Boletín 3 de derivadas (soluciones)

lunes, 6 de noviembre de 2023 0:24

① $f'(x) = \dfrac{1}{\underbrace{\frac{x^2}{x+a}}} \cdot \dfrac{2x(x+a) - x^2}{(x+a)^2} = \dfrac{(x+a)}{x^2} \dfrac{x^2+2xa}{(x+a)^2} = \dfrac{x^2+2xa}{x^2(x+a)}$

$f'(2) = \dfrac{4+4a}{4(2+a)} = 0 \Rightarrow 4+4a=0 \Rightarrow a=-1$

② $f(x) = 2x^3 + 12x^2 + ax + b \rightarrow f'(x) = 6x^2 + 24x + a$

recta tg a $f$ en $x=-2$ sea $y = 2x-3$ $\begin{cases} f'(-2)=2 \\ f(-2)=-7 \end{cases}$

$f'(-2) = 24 - 48 + a = 2$ $\Rightarrow a=26$

$f(-2) = -16 + 48 - 2a + b = -7$

$32 - 52 + b = -7 \Rightarrow b = 13$

③ $y = x^2 - 5x + k \quad y' = 2x - 5 \quad f'(1) = -3$

recta tg en $x=1$ pasa por $(1, f(1))$ $f(1) = 1 - 5 + k \Rightarrow (1, k-4)$

la ecuación de la recta tg sería:

$y - (k-4) = -3(x-1) \Rightarrow$ como pasa por $(0,0)$

$0 - (k-4) = -3(0-1) \Rightarrow 4 - k = 3 \Rightarrow k = 1$

④ $f(x) = x^3 - 3x^2 + x \Rightarrow f'(x) = 3x^2 - 6x + 1$

$f'(a) = \text{tg } 45 = 1 \qquad 3x^2 - 6x + 1 = 1 \Rightarrow 3x^2 - 6x = 0$ $\begin{cases} x=0 \\ x=2 \end{cases}$

⑤ $f(x) = 5 + 6x - 3x^2$

$x=0 \Rightarrow f(0) = 5 \qquad x=3 \Rightarrow f(3) = -4 \Rightarrow m = \dfrac{f(3) - f(0)}{3-0} = \dfrac{-9}{3} = -3$

$f'(x) = 6 - 6x = -3 \Rightarrow -6x = -9 \Rightarrow x = 9/6 = 3/2 \qquad f\left(\frac{3}{2}\right) = 5 + 9 - \frac{27}{4} = \frac{29}{4}$

$y - \frac{29}{4} = -3\left(x - \frac{3}{2}\right)$

⑥ $f(x) = x^3 + ax^2 + bx + c \qquad f'(x) = 3x^2 + 2ax + b$

$f'(-4) = 0 \quad f'(0) = 0 \quad f(1) = 1$

(6) $f(x)=x^3+ax^2+5x+c$ $\quad f'(x)=3x^2+2ax+5$

$f'(-4)=0 \quad f'(0)=0 \quad f(1)=1$

$f'(-4)=48-8a+5=0$

$f'(0)=5=0$

$f(1)=1+a+b+c=1$

$b=0$

$48-8a=0 \Rightarrow a=6$

$1+6+0+c=1 \Rightarrow c=-6$

(7) $f(x)=x^3+ax^2+bx+5 \quad f'(x)=3x^2+2ax+b \quad f''(x)=6x+2a$

$f''(1)=0 \quad f'(1)=0$

$f''(1)=6+2a=0$

$f'(1)=3+2a+b=0$

$a=-3$

$3-6+b=0 \Rightarrow b=3$

(8) $f(x)=x^3+bx^2+mx+1 \quad f'(x)=3x^2+2bx+m \quad f''(x)=6x+2b$

$f''(0)=0 \quad f(0)=1 \quad f'(0)=1$

$f''(0)=2b=0$

$f(0)=1=1$

$f'(0)=m=1$

$b=0$

$m=1$

(9) $f(x)=ax^3+bx^2+cx+d \quad f'(x)=3ax^2+2bx+c \quad f''(x)=6ax+2b$

$f''(1)=0 \quad f(1)=0 \quad f'(1)=-3 \quad f'(0)=0$

$f''(1)=6a+2b=0$

$f(1)=a+b+c+d=0$

$f'(1)=3a+2b+c=-3$

$f'(0)=c=0$

$c=0$

$6a+2b=0$

$a+b+d=0$

$3a+2b=-3$

$6a+2b=0$

$3a+2b=-3$

$3a=3 \Rightarrow a=1$

$6(-1)+2b=0$

$b=3$

$1+3+d=0 \Rightarrow d=-4$

(10) $f(x)=ax^3+bx^2+cx+d \quad f'(x)=3ax^2+2bx+c$

$f'(0)=0 \quad f(0)=4 \quad f'(2)=0 \quad f(2)=0$

$f'(0)=c=0$

$f(0)=d=4$

$f'(2)=12a+4b+c=0$

$f(2)=8a+4b+2c+d=0$

$c=0$

$d=4$

$12a+4b=0$

$8a+4b=-4$

$4a=4 \Rightarrow a=1$

$12+4b=0$

$b=-3$