Derivación

lunes, 20 de abril de 2020 09:56

$f(x) = x^2 + 7x + 9$

$f'(x) = 2x + 7 + 0 = 2x + 7$

1) obtener derivadas funciones más complejas
2) uso de la derivada para representar una función

1) $\boxed{f(x) = k \cdot x^n}$ k, n números

$f(x) = 3x^7$ $k = 3$ $n = 7$ POTENCIAL

$g(x) = -\frac{3}{5}\sqrt{x} = -\frac{3}{5}x^{1/2}$ $k = -\frac{3}{5}$ $n = \frac{1}{2}$

$h(x) = \frac{7}{x^3} = 7x^{-3}$ $k = 7$ $n = -3$

$m(x) = \frac{1}{\sqrt[3]{x}} = \frac{1}{x^{1/3}} = x^{-1/3}$ $k = 1$ $n = -1/3$

$$\boxed{f'(x) = k \cdot n \cdot x^{n-1}}$$

$f(x) = 3x^7$ $f'(x) = 3 \cdot 7\, x^{7-1} = 21x^6$

$f(x) = 3x^7 \Rightarrow f'(x) = 21x^6$

$g(x) = \underbrace{-\frac{3}{5}\sqrt{x}}_{-\frac{3}{5}x^{1/2}}$ $g'(x) = -\frac{3}{5} \cdot \frac{1}{2}x^{1/2-1} = \frac{-3}{10}x^{-1/2} = \boxed{\frac{-3}{10\sqrt{x}}}$

$h(x) = \frac{7}{x^3} = 7x^{-3}$ $h'(x) = 7 \cdot (-3)\, x^{-3-1} = -21x^{-4} = \boxed{-\frac{21}{x^4}}$

$m(x) = \frac{1}{\sqrt[3]{x}} = 1 \cdot x^{-1/3}$ $m'(x) = \underbrace{1 \cdot \left(-\frac{1}{3}\right)}_{\text{¡NO!}} x^{-1/3-1} = -\frac{1}{3}x^{-4/3} =$

$= \frac{-1}{3 \cdot x^{4/3}} =$

$= \boxed{\frac{-1}{3\sqrt[3]{x^4}}} = \boxed{\frac{-1}{3x\sqrt[3]{x}}}$

DERIVADAS MÁS COMPLEJAS

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$$f(x) = 3\sqrt{x} + 5x^3 - \frac{1}{x^2} + 6\sqrt[3]{x}$$

$6\sqrt[3]{x} \xrightarrow{d} 6x^{1/3}$

$6\cdot\frac{1}{3}x^{1/3-1} \rightarrow \frac{6x^{-2/3}}{3} \rightarrow \frac{\cancel{6}}{\cancel{3}\cdot x^{2/3}} \rightarrow \boxed{\frac{2}{\sqrt[3]{x^2}}}$

$f'(x)$

$3\sqrt{x} \xrightarrow{d} 3x^{1/2} \rightarrow 3\cdot\frac{1}{2}x^{1/2-1} = \frac{3}{2}x^{-1/2} \rightarrow \frac{3}{2\sqrt{x}}$

$5x^3 \xrightarrow{d} 5\cdot 3\cdot x^{3-1} \rightarrow 15x^2$

$\frac{1}{x^2} \xrightarrow{d}$ x^{-2} $\rightarrow (-2)x^{-2-1} \rightarrow -2x^{-3} \rightarrow \frac{-2}{x^3}$

$$f'(x) = \frac{3}{2\sqrt{x}} + 15x^2 - \frac{-2}{x^3} + \frac{2}{\sqrt[3]{x^2}} =$$

$$= \boxed{\frac{3}{2\sqrt{x}} + 15x^2 + \frac{2}{x^3} + \frac{2}{\sqrt[3]{x^2}}}$$

¿Y esto para qué nos sirve?

OBTENER EC DE LA RECTA TANGENTE

(Gráfico)

Cambia en cada punto

$\boxed{x = 1}$

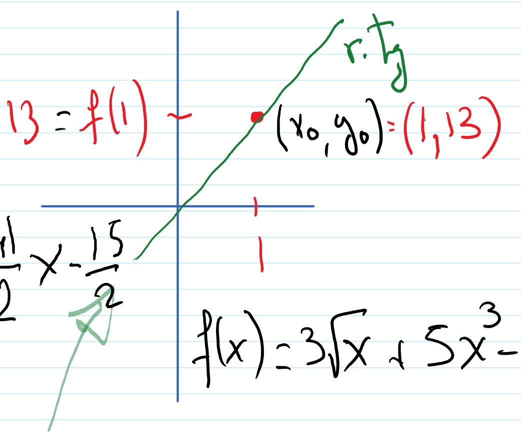
PTO.-PTE.

$$y - y_0 = m(x - x_0)$$

$x_0 = 1$

$y_0 = f(1) = 3\sqrt{1} + 5\cdot 1^3 - \frac{1}{1^2} + 6\sqrt[3]{1} =$

$= 3 + 5 - 1 + 6 = \boxed{13}$



$y = \frac{41}{2}x - \frac{15}{2}$

$f(x) = 3\sqrt{x} + 5x^3 - \frac{1}{x^2} + 6\sqrt[3]{x}$

$f(x) = 3\sqrt{x} + 5x^3 - \frac{1}{x^2} + 6\sqrt[3]{x}$ $\qquad = 3+5-1+6 = \underline{13}$

$m = f'(1) = \frac{3}{2\sqrt{1}} + 15\cdot 1^2 + \frac{2}{1^3} + \frac{2}{\sqrt[3]{1^2}} =$

$x=1$ $\qquad = \frac{3}{2} + 15 + 2 + 2 = \frac{3}{2} + 19 =$

$= \boxed{\frac{41}{2} = 20'5}$

$$\boxed{f'(x) = \frac{3}{2\sqrt{x}} + 15x^2 + \frac{2}{x^3} + \frac{2}{\sqrt[3]{x^2}}}$$

Recta tg a la gráfica de $f(x)$ es

$$y - 13 = \frac{41}{2}(x-1)$$
$$2y - 26 = 41x - 41$$
$$2y = 41x - 15$$
$$\boxed{y = \frac{41}{2}x - \frac{15}{2}}$$

(álgebra)

Recta tg (reescritura)

$$y - y_0 = m(x - x_0)$$

$$y - f(x_0) = f'(x_0)(x - x_0)$$

EJEMPLO

$f(x) = x^3 - 3x^2 - 6x + 8$ (cúbica)

(Representar)

$3\cdot 2 \cdot x$

$f'(x) = 3x^2 - 6x - 6 + 0 = \boxed{3x^2 - 6x - 6}$