

## BOLETÍN 1.5.- CÁLCULO PRÁCTICO DE DERIVADAS

Halla la función derivada de las siguientes funciones:

1.  $f(x) = 3x^2 - 6x + 5$

2.  $f(x) = \sqrt{x} + \sqrt[3]{x}$

3.  $f(x) = \sqrt{2x} + \sqrt[3]{5x}$

4.  $f(x) = \frac{1}{x\sqrt{x}}$

5.  $f(x) = \operatorname{sen} x \cos x$

6.  $f(x) = \operatorname{tg} x$

7.  $f(x) = x e^x$

8.  $f(x) = x \cdot 2^x$

9.  $f(x) = (x^2 + 1) \cdot \log_2 x$

10.  $f(x) = \frac{x^2 + 1}{x^2 - 1}$

11.  $f(x) = \frac{x^3 + 3x^2 - 5x + 3}{x}$

12.  $f(x) = \frac{\log x}{x}$

Halla la función derivada de las siguientes funciones compuestas:

13.  $f(x) = \operatorname{sen} \sqrt{x}$

14.  $f(x) = \cos x^2$

15.  $f(x) = \operatorname{tg}(2x + \pi)$

16.  $f(x) = (\operatorname{sen} x)^2 = \operatorname{sen}^2 x$

17.  $f(x) = e^{3x-5}$

18.  $f(x) = \operatorname{arc} \operatorname{tg}(x^2 - 2x)$

19.  $f(x) = \ln \sqrt{x}$

20.  $f(x) = \operatorname{sen}^2\left(3x + \frac{\pi}{2}\right)$

21.  $f(x) = \operatorname{sen}(x^2 - 5x + 7)$

22.  $f(x) = \sqrt[3]{(5x+3)^2} = (5x+3)^{2/3}$

23.  $f(x) = \operatorname{sen}(3x+1) \cdot \cos(3x+1)$

24.  $f(x) = \frac{\log x^2}{x}$

25.  $f(x) = \cos(3x - \pi)$

26.  $f(x) = \sqrt{1+2x}$

27.  $f(x) = x e^{2x+1}$

28.  $f(x) = \frac{\operatorname{sen}(x^2+1)}{\sqrt{1-x^2}}$

## Soluciones

$$1. f'(x) = 6x - 6$$

$$2. f'(x) = \frac{1}{2\sqrt{x}} + \frac{1}{3\sqrt[3]{x^2}}$$

$$3. f'(x) = \frac{1}{\sqrt{2x}} + \frac{5}{3\sqrt[3]{5x}}$$

$$4. f(x) = x^{-3/2} \rightarrow f'(x) = -\frac{3}{2} x^{-5/2} = \frac{-3}{2\sqrt{x^5}} = \frac{-3}{2x^2\sqrt{x}}$$

$$5. f'(x) = \cos^2 x - \sin^2 x$$

$$6. f'(x) = 1 + \tan^2 x = \frac{1}{\cos^2 x}$$

$$7. f'(x) = e^x + x e^x = e^x(1 + x)$$

$$8. f'(x) = 2^x + x \cdot 2^x \cdot \ln 2 = 2^x(1 + x \ln 2)$$

$$9. f'(x) = 2x \log_2 x + (x^2 + 1) \cdot \frac{1}{x} \cdot \frac{1}{\ln 2} = 2x \log_2 x + \frac{(x^2 + 1)}{x \ln 2}$$

$$10. f'(x) = \frac{2x(x^2 - 1) - (x^2 + 1) 2x}{(x^2 - 1)^2} = \frac{2x^3 - 2x - 2x^3 - 2x}{(x^2 - 1)^2} = \frac{-4x}{(x^2 - 1)^2}$$

$$11. f'(x) = \frac{(3x^2 + 6x - 5)x - (x^3 + 3x^2 - 5x + 3)}{x^2} = \frac{2x^3 + 3x^2 - 3}{x^2} = 2x + 3 - \frac{3}{x^2}$$

$$12. f'(x) = \frac{[1/(\ln 10)] - \log x}{x^2} = \frac{1 - \ln 10 \log x}{x^2 \ln 10}$$

$$13. f'(x) = (\cos \sqrt{x}) \cdot \frac{1}{2\sqrt{x}}$$

$$14. f'(x) = (-\sin x^2) \cdot 2x = -2x \sin x^2$$

$$15. f'(x) = [1 + \tan^2(2x + \pi)] \cdot 2$$

$$16. f'(x) = 2 \sin x (\cos x) = 2 \sin x \cos x$$

$$17. f'(x) = e^{3x-5} \cdot 3 = 3e^{3x-5}$$

$$18. f'(x) = \frac{2x-2}{1+(x^2-2x)^2} = \frac{2x-2}{x^4-4x^3+4x^2+1}$$

$$24. f(x) = \frac{2 \log x}{x} \rightarrow f'(x) = \frac{2(1 - \ln 10 \log x)}{x^2 \ln 10}$$

$$25. f'(x) = -3 \sin(3x - \pi)$$

$$26. f'(x) = \frac{1}{\sqrt{1+2x}}$$

$$27. f'(x) = e^{2x+1} + x e^{2x+1} \cdot 2 = e^{2x+1} (1 + 2x)$$

$$28. f'(x) = \frac{2x\sqrt{1-x^2} \cos(x^2+1) + [x \sin(x^2+1)]/\sqrt{1-x^2}}{1-x^2} = \frac{2x(1-x^2) \cos(x^2+1) + x \sin(x^2+1)}{\sqrt{(1-x^2)^3}}$$

$$19. f'(x) = \frac{1}{\sqrt{x}} \cdot \frac{1}{2\sqrt{x}} = \frac{1}{2x}$$

O, de otro modo:  $\ln \sqrt{x} = \ln x^{1/2} = \frac{1}{2} \ln x \rightarrow f'(x) = \frac{1}{2} \cdot \frac{1}{x}$

$$20. f'(x) = 2 \sin\left(3x + \frac{\pi}{2}\right) \cdot D\left[\sin\left(3x + \frac{\pi}{2}\right)\right]$$

$$D\left[\sin\left(3x + \frac{\pi}{2}\right)\right] = \cos\left(3x + \frac{\pi}{2}\right) \cdot D\left[3x + \frac{\pi}{2}\right] = \cos\left(3x + \frac{\pi}{2}\right) \cdot 3$$

Por tanto:  $f'(x) = 2 \sin\left(3x + \frac{\pi}{2}\right) \cdot \cos\left(3x + \frac{\pi}{2}\right) \cdot 3$

$$21. f'(x) = (2x-5) \cos(x^2-5x+7)$$

$$22. f'(x) = \frac{2}{3} (5x+3)^{-1/3} \cdot 5 = \frac{10}{3\sqrt[3]{5x+3}}$$

$$23. f'(x) = 3 [\cos^2(3x+1) - \sin^2(3x+1)]$$