

2.4 EJERCICIOS DE RECAPITULACIÓN

Halla la derivada de las siguientes funciones:

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

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

$$3 \quad f(x) = \frac{x^2 - 2x + 1}{5}$$

$$4 \quad f(x) = (3x - 2)e^x$$

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

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

$$7 \quad f(x) = \frac{\sqrt[3]{x}}{x^2} - \frac{x^2 - 1}{3}$$

$$8 \quad f(x) = \frac{x^3 - 3x^4 + 2x + 1}{x}$$

$$9 \quad f(x) = \frac{3}{2x^2} - \frac{2x^2}{3} + \ln 5$$

$$10 \quad f(x) = \sqrt{\frac{2}{x^3}} - \frac{x^2}{3} + \sqrt{2}$$

$$11 \quad f(x) = \frac{2\sqrt{3}}{4} + \frac{3 \ln x}{2}$$

$$12 \quad f(x) = \operatorname{sen} x \cdot \cos x$$

$$13 \quad f(x) = \frac{e^x}{x^2 - 1}$$

$$14 \quad f(x) = \frac{x^2 - 1}{2x + 1}$$

$$15 \quad f(x) = (x^2 - 1)e^x - \ln x$$

$$16 \quad f(x) = 2^x - 3 \operatorname{tg} x$$

$$17 \quad f(x) = x^3 e^x + x^2 \operatorname{sen} x$$

$$18 \quad f(x) = \frac{x - 1}{3x - 2}$$

$$19 \quad f(x) = \frac{\sqrt{x}}{\operatorname{sen} x}$$

$$20 \quad f(x) = (x^2 - 1)^4$$

$$21 \quad f(x) = \left(\frac{x - 1}{x + 2}\right)^3$$

$$22 \quad f(x) = \frac{2x - 1}{(x + 1)^2}$$

$$23 \quad f(x) = \frac{x + 1}{(x - 1)^3}$$

$$24 \quad f(x) = \ln\left(\frac{x - 1}{x + 4}\right)$$

$$25 \quad f(x) = \cos^2(3x - 2)$$

$$26 \quad f(x) = \sqrt{\operatorname{sen} x}$$

$$27 \quad f(x) = \ln(\operatorname{sen} x^2)$$

$$28 \quad f(x) = e^{4x - 1} \cdot \operatorname{sen}(3x^2)$$

$$29 \quad f(x) = 2^{4x^2 - 1} \cdot \ln(8x)$$

$$30 \quad f(x) = \frac{(2x + 3)^2}{1 - x}$$

$$31 \quad f(x) = \operatorname{tg}\left(\frac{2}{x - 3}\right)$$

$$32 \quad f(x) = \frac{e^{5x + 1}}{x + 2}$$

$$33 \quad f(x) = \frac{\ln^2 x}{x}$$

$$34 \quad f(x) = \frac{x e^x}{x + 2}$$

$$35 \quad f(x) = \frac{\sqrt{x - 1}}{3x + 4}$$

$$36 \quad f(x) = \sqrt{\frac{3x + 1}{x + 2}}$$

$$37 \quad f(x) = \frac{\operatorname{sen} x}{x - 2}$$

$$38 \quad f(x) = \ln\left(\frac{2x - 1}{3x + 4}\right)$$

$$39 \quad f(x) = \frac{\sqrt{x + 2}}{x + 1}$$

$$40 \quad f(x) = \frac{\sqrt{x}(x^2 - 1)}{5} + \ln 4$$

Soluciones

$$\text{1} \quad f'(x) = x^2 - \frac{x}{2}$$

$$\text{2} \quad f'(x) = \frac{5x^4}{3} + \frac{4}{x^3}$$

$$\text{3} \quad f'(x) = \frac{2x-2}{5}$$

$$\text{4} \quad f'(x) = 3e^x + (3x-2)e^x = (3x+1)e^x$$

$$\text{5} \quad f'(x) = \frac{1}{2\sqrt{x}} + \frac{6}{x^4}$$

$$\text{6} \quad f'(x) = \frac{-1}{x^2} - \frac{1}{9\sqrt[3]{x^4}} + 4x$$

$$\text{7} \quad f'(x) = \frac{-5}{3\sqrt[3]{x^8}} - \frac{2x}{3}$$

$$\text{8} \quad f'(x) = x^2 - 3x^3 + 2 + \frac{1}{x}$$

$$f'(x) = 2x - 9x^2 - \frac{1}{x^2}$$

$$\text{9} \quad f'(x) = \frac{-3}{x^3} - \frac{4x}{3}$$

$$\text{10} \quad f'(x) = \frac{-3\sqrt{2}}{2\sqrt{x^5}} - \frac{2x}{3}$$

$$\text{11} \quad f'(x) = \frac{3}{2x}$$

$$\text{12} \quad f'(x) = \cos^2 x - \sin^2 x$$

$$\text{13} \quad f'(x) = \frac{e^x(x^2-1) - e^x \cdot 2x}{(x^2-1)^2} = \frac{(x^2-2x-1)e^x}{(x^2-1)^2}$$

$$\text{14} \quad f'(x) = \frac{2x(2x+1) - (x^2-1) \cdot 2}{(2x+1)^2} = \frac{2x^2+2x+2}{(2x+1)^2}$$

$$\text{15} \quad f'(x) = 2xe^x + (x^2-1)e^x - \frac{1}{x} = \\ = (x^2+2x-1)e^x - \frac{1}{x}$$

$$\text{16} \quad f'(x) = 2^x \cdot \ln 2 - 3(1 + \operatorname{tg}^2 x) = \\ = 2^x \cdot \ln 2 - 3 - 3 \operatorname{tg}^2 x$$

$$\text{17} \quad f'(x) = 3x^2 e^x + x^3 e^x + 2x \operatorname{sen} x + x^2 \operatorname{cos} x$$

$$\text{18} \quad f'(x) = \frac{1 \cdot (3x-2) - (x-1) \cdot 3}{(3x-2)^2} = \frac{1}{(3x-2)^2}$$

$$\begin{aligned} 19 \quad f'(x) &= \frac{\frac{1}{2\sqrt{x}} \operatorname{sen} x - \sqrt{x} \cos x}{\operatorname{sen}^2 x} = \\ &= \frac{\operatorname{sen} x - 2x \cos x}{2\sqrt{x} \operatorname{sen}^2 x} \end{aligned}$$

Página 15

$$20 \quad f'(x) = 4(x^2 - 1)^3 \cdot 2x = 8x(x^2 - 1)^3$$

$$21 \quad f'(x) = 3 \left(\frac{x-1}{x+2} \right)^2 \cdot \frac{3}{(x+2)^2} = \frac{9(x-1)^2}{(x+2)^4}$$

$$\begin{aligned} 22 \quad f'(x) &= \frac{2(x+1)^2 - (2x-1) \cdot 2(x+1)}{(x+1)^4} = \\ &= \frac{(x+1) \cdot (2x+2-4x+2)}{(x+1)^4} = \frac{-2x+4}{(x+1)^3} \end{aligned}$$

$$\begin{aligned} 23 \quad f'(x) &= \frac{(x-1)^3 - (x+1) \cdot 3(x-1)^2}{(x-1)^6} = \\ &= \frac{(x-1)^2(x-1-3x-3)}{(x-1)^6} = \frac{-2x-4}{(x-1)^4} \end{aligned}$$

$$\begin{aligned} 24 \quad f'(x) &= \frac{1}{\frac{x-1}{x+4}} \cdot \frac{5}{(x+4)^2} = \frac{(x+4)}{(x-1)} \cdot \frac{5}{(x+4)^2} = \\ &= \frac{5}{(x-1)(x+4)} = \frac{5}{x^2+3x-4} \end{aligned}$$

$$\begin{aligned} 25 \quad f'(x) &= 2 \cos(3x-2) \cdot (-\operatorname{sen}(3x-2)) \cdot 3 = \\ &= -6 \cos(3x-2) \operatorname{sen}(3x-2) \end{aligned}$$

$$26 \quad f'(x) = \frac{\cos x}{2\sqrt{\operatorname{sen} x}}$$

$$27 \quad f'(x) = \frac{2x \cos x^2}{\operatorname{sen} x^2}$$

$$\begin{aligned} 28 \quad f'(x) &= e^{4x-1} \cdot 4 \operatorname{sen}(3x^2) + e^{4x-1} \cdot \cos(3x^2) 6x = \\ &= 4e^{4x-1} \operatorname{sen}(3x^2) + 6xe^{4x-1} \cos(3x^2) \end{aligned}$$

$$\begin{aligned} 29 \quad f'(x) &= 2^{4x^2-1} \cdot \ln 2 \cdot 8x \cdot \ln(8x) + 2^{4x^2-1} \cdot \frac{8}{8x} = \\ &= 2^{4x^2-1} \cdot \ln 2 \cdot 8x \cdot \ln(8x) + \frac{2^{4x^2-1}}{x} \end{aligned}$$

$$\begin{aligned} 30 \quad f'(x) &= \frac{2(2x+3) \cdot 2(1-x) - (2x+3)^2 \cdot (-1)}{(1-x)^2} = \\ &= \frac{(2x+3)(-2x+7)}{(1-x)^2} = \frac{-4x^2+8x+21}{(1-x)^2} \end{aligned}$$

$$31 \quad f'(x) = \left[1 + \operatorname{tg}^2 \left(\frac{2}{x-3} \right) \right] \cdot \frac{-2}{(x-3)^2}$$

$$\begin{aligned} 32 \quad f'(x) &= \frac{e^{5x+1} \cdot 5 \cdot (x+2) - e^{5x+1} \cdot 1}{(x+2)^2} = \\ &= \frac{e^{5x+1}(5x+9)}{(x+2)^2} \end{aligned}$$

$$33 \quad f'(x) = \frac{2 \ln x \cdot \frac{1}{x} \cdot x - \ln^2 x \cdot 1}{x^2} = \frac{2 \ln x - \ln^2 x}{x^2}$$

$$\begin{aligned} 34 \quad f'(x) &= \frac{(e^x + x e^x)(x+2) - x e^x}{(x+2)^2} = \\ &= \frac{(x^2 + 2x + 2) e^x}{(x+2)^2} \end{aligned}$$

$$\begin{aligned} 35 \quad f'(x) &= \frac{\frac{1}{2\sqrt{x-1}} \cdot (3x+4) - \sqrt{x-1} \cdot 3}{(3x+4)^2} = \\ &= \frac{-3x+2}{2\sqrt{x-1}(3x+4)^2} \end{aligned}$$

$$\begin{aligned} 36 \quad f'(x) &= \frac{1}{2\sqrt{\frac{3x+1}{x+2}}} \cdot \frac{3(x+2) - (3x+1) \cdot 1}{(x+2)^2} = \\ &= \frac{\sqrt{x+2}}{2\sqrt{3x+1}} \cdot \frac{5}{(x+2)^2} \end{aligned}$$

$$37 \quad f'(x) = \frac{(x-2) \cos x - \operatorname{sen} x}{(x-2)^2}$$

$$38 \quad f'(x) = \frac{11}{6x^2+5x-4}$$

$$39 \quad f'(x) = \frac{-x-3}{2\sqrt{x+2} \cdot (x+1)^2}$$

$$\begin{aligned} 40 \quad f'(x) &= \frac{\frac{1}{2\sqrt{x}}(x^2-1) + \sqrt{x} \cdot 2x}{5} = \\ &= \frac{x^2-1+4x^2}{10\sqrt{x}} = \frac{5x^2-1}{10\sqrt{x}} \end{aligned}$$