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| **Nombres y Apellidos** | **Curso** | **Fecha** |

1. In Exercises 1–12, find the first and second derivatives. [**(Hass et al., 2018, p. 121)**](https://www.zotero.org/google-docs/?Kq5sCe)

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| **(E1.)**  **\begin{align*} y&=-x^2+3 \end{align*}** | **(E2.)**  **\begin{align*} y&=x^2+x+8 \end{align*}** |
| **Solution:**  **\begin{align*} y&=-x^2+3 \\y'&=-2x \\y^2&=-2 \end{align*}** | **Solution:**  **\begin{align*} y&=x^2+x+8 \\y'&=2x+1 \\y^2&=2 \end{align*}** |
| **(E3.)**  **\begin{align*} s&=5t^3-3t^5  \end{align*}** | **(E4.)**  **\begin{align*} w&=3z^7-7z^3+21z^2 \end{align*}** |
| **Solution:**  **\begin{align*} s&=5t^3-3t^5 \\s'&=15t^2-15t^4 \\s^2&=20t-60t^3 \end{align*}** | **Solution:**  **\begin{align*} w&=3z^7-7z^3+21z^2 \\w'&=21x^6-21z^2+42z \\w^2&=126z^5-42z+42 \end{align*}** |
| **(E9.)**  **\begin{align*} y&=6x^2-10x-5x^-^2 \end{align*}** | **(E10.)**  **\begin{align*} y&=4-2x-x^-^3 \end{align*}** |
| **Solution:**  **\begin{align*} y&=6x^2-10x-\frac{1}{5x^2} \\y'&=12x-10-\frac{(1)'(5x^2)-(1)(5x^2)'}{(5x^2)^2} \\&=12x-10+\frac{2}{5x^3} \\y^2&=12+\frac{(2)'(5x^3)-(2)(5x^3)'}{(5x^3)^2} \\&=12-\frac{6}{5x^4} \end{align*}** | **Solution:**  **\begin{align*} y&=4-2x-\frac{1}{x^3} \\y'&=-2-\frac{(1)'(x^3)-(1)(x^3)'}{(x^3)^2} \\&=-2+\frac{3}{x^4} \\y^2&=-\frac{(3)'(x^4)-(3)(x^4)'}{(x^4)^2} \\&=-\frac{12}{x^5} \end{align*}** |

1. Find the derivatives of the functions in Exercises 17–40.

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| **(E17.)**  **\begin{align*} y&=\frac{2x+5}{3x-2}  \end{align*}** | **(E18.)**  **\begin{align*} y&=\frac{4-3x}{3x^2+x} \end{align*}** |
| **Solution:**  **\begin{align*} y&=\frac{2x+5}{3x-2} \\y'&=\frac{(2x+5)'(3x-2)-(2x+5)(3x-2)'}{(3x-2)^2} \\&=\frac{2(3x-2)-3(2x+5)}{(3x-2)^2} \\&=\frac{6x-4-6x-15}{(3x-2)^2} \\&=-\frac{19}{(3x-2)^2} \end{align*}** | **Solution:**  **\begin{align*} y&=\frac{4-3x}{3x^2+x} \\y'&=\frac{(4-3x)'(3x^2+x)-(4-3x)(3x^2+x)'}{(3x^2+x)^2} \\&=\frac{-3(3x^2+x)-(6x+1)(4-3x)}{(3x^2+x)^2} \\&=\frac{-9x^2-3x-21x+18x^2-4}{(3x^2+x)^2} \\&=-\frac{9x^2-24x-4}{(3x^2+x)^2} \end{align*}** |

1. Find the first and second derivatives of the functions in Exercises 33–38.

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| **(E33.)**  **\begin{align*} y&=\frac{x^3+7}{x}  \end{align*}** | **(E34.)**  **\begin{align*} y&=\frac{t^2+5t-1}{t^2}  \end{align*}** |
| **Solution:**  **\begin{align*} y&=\frac{x^3+7}{x} \\y'&=\frac{(x^3+7)'(x)-(x^3+7)(x)'}{x^2} \\&=\frac{3x^2-x^3+7}{x^2} \\y''&=\frac{(-x^3+3x^2+7)'(x^2)-(-x^3+3x^2+7)(x^2)'}{x^4} \\&=\frac{(-3x^2+6x)(x^2)-(2x)x^3-3x^2+7}{x^4} \\&=\frac{-3x^4+6x^3-2x^4-3x^3+7x^2}{x^4} \\&=\frac{-5x^4+3x^3+7x^2}{x^4} \end{align*}** | **Solution:**  **\begin{align*} y&=\frac{t^2+5t-1}{t^2} \\y'&=\frac{(t^2+5t-1)'(t^2)-(t^2+5t-1)(t^2)'}{t^4} \\&=\frac{(2t+5)(t^2)-t^2-5t+1(2t)}{t^4} \\&=\frac{2t^3+5t^2-2t^3-10t^2+2t}{t^4} \\&=-\frac{5t+2}{t^3} \\y''&=\frac{(-5t+2)'(t^3)-(-5t+2)(t^3)'}{t^6} \\y''&=\frac{-5t^3-(3t^2)5t-2}{t^6} \\y''&=\frac{-5t^3-15t^3-6t^2}{t^6} \\y''&=\frac{-20t^3-6t^2}{t^6} \end{align*}** |

1. En los ejercicios 1-8, encuentre dx/dy [**(Zill et al., 2011, p. 136)**](https://www.zotero.org/google-docs/?3Tu3tI)

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| **(E2.)**  **\begin{align*} \displaystyle y=\pi^6 \end{align*}** | **(E3.)**  **\begin{align*} y&=x^9 \end{align*}** |
| **Solution:**  **\begin{align*} y&=\pi^6 \\&= 6\pi^5 \end{align*}** | **Solution:**  **\begin{align*} y&=x^9 \\&= 9x^8 \end{align*}** |
| **(E5.)**  **\begin{align*} y&=7x^2-4x \end{align*}** | **(E6.)**  **\begin{align*} y&=6x^3+3x^2-10   \end{align*}** |
| **Solution:**  **\begin{align*} y&=7x^2-4x \\&=14x-4 \end{align*}** | **Solution:**  **\begin{align*} y&=6x^3+3x^2-10 \\&=18x^2+6x  \end{align*}** |
| **(E8.)**  **\begin{align*} y&=\frac{x-x^2}{\sqrt{x}} \\ \end{align*}** |  |
| **Solution:**  **\begin{align*} y&=\frac{x-x^2}{\sqrt{x}} \\&=\frac{(x-2)'(\sqrt{x})-(x-2)(\sqrt{x})'}{(\sqrt{x})^2} \\&=\frac{\sqrt{x}-x+2}{x(2\sqrt{x})} \end{align*}** |  |

1. En los problemas 9-16, encuentre f’ (x). Simplifique

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| **(E9.)**  **\begin{align*} f(x)&=\frac{1}{5}x^5-3x^4+9x^2+1  \end{align*}** | **(E10.)**  **\begin{align*} f(x)&=-\frac{2}{3}x^6+4^5-13x^2+8x+2  \end{align*}** |
| **Solution:**  **\begin{align*} f(x)&=\frac{1}{5}x^5-3x^4+9x^2+1 \\f'(x)&=x^4-12x^3+18 \end{align*}** | **Solution:**  **\begin{align*} f(x)&=-\frac{2}{3}x^6+4^5-13x^2+8x+2 \\f'(x)&=-4x^5+20x^4-26x+8 \end{align*}** |
| **(E11.)**  **\begin{align*} f(x)&=x^3(4x^2-5x-6)  \end{align*}** | **(E16.)**  **\begin{align*} f(x)&=(9+x)(9-x)  \end{align*}** |
| **Solution:**  **\begin{align*} f(x)&=(x^3)'(4x^2-5x-6)+x^3(4x^2-5x-6)' \\f'(x)&=3x^2(4x^2-5x-6)+x^3(8x-5) \\f'(x)&= 12x^4-15x^3-18x^2+8x^4-5x^3 \\f'(x)&=20x^4-20x^3-18x2 \end{align*}** | **Solution:**  **\begin{align*} f(x)&=(9+x)(9-x) \\f'(x)&=(9+x)'(9-x)+(9+x)(9-x)' \\f'(x)&=9-x +9+x \\f'(x)&=18 \end{align*}** |

1. En los problemas 21-24, encuentre una ecuación de la recta tangente a la gráfica de la función dada en el valor indicado de x.

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| **(E21.)**  **\begin{align*} y=2x^3-1;x=-1 \end{align*}** | **(E24.)**  **\begin{align*} y=-x^3+6x^2;x=1 \end{align*}** |
| **Solution:**  **\begin{align*} y&=2x^3-1;x=-1 \\&=2(-1)^3-1 \\&=-3 \\&=(-1,-3) \\y'&=6x^2 \\&m=6 \\y&=m(x-xo)+yo \\y&=6x+3 \end{align*}** | **Solution:**  **\begin{align*} y&=-x^3+6x^2;x=1 \\&=-(1)^3+6(1)^2 \\&=5 \\&=(1,5) \\y'&=-3x^2+12x \\&m=9 \\y&=m(x-xo)+yo \\y&=9x-9+5 \\y&=9x-4 \end{align*}** |

1. En los problemas 39 y 40, encuentre la derivada de orden superior indicada.

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| **(E39.)**  **\begin{align*} f(x)=4x^6+x^5-x^3; f^4(x) \end{align*}** | **(E40.)**  **\begin{align*} f(x)&=x^4-\frac{10}{x}; d^5y/dx^5  \end{align*}** |
| \begin{align*} f(x)&=4x^6+x^5-x^3; f^4(x) \\f(x)'&=24x^5+5x^4-3x^2 \\f(x)''&=120x^4+20x^3-6x \\f(x)^3&=480x^3+60x^2-6 \\f(x)^4&=1440x^2+120x \end{align*} | \begin{align*} f(x)&=x^4-\frac{10}{x}; d^5y/dx^5 \\dy/dx&=3x^4-\frac{10}{x^2} \\d^2y/dx^2&=12x^3-\frac{20x}{x^4} \\&=12x^3-\frac{20}{x^3} \\d^3y/dx^3&=36x^2-\frac{(-20)'(x^3)-(-20)(x^3)'}{x^9} \\&=36x^2-\frac{60x^2}{x^9} \\&=36x^2-\frac{60}{x^7} \\d^4y/dx^4&=72x-\frac{(-60)'(x^7)-(-60)(x^7)'}{x^4^9} \\&=72x-\frac{360x^6}{x^4^9} \\&=72x-\frac{360}{x^4^3} \\d^5y/dx^5&=72-\frac{(-360)'(x^4^3)-(-360)(x^4^3)'}{(x^4^3)^2} \\&=72-\frac{15480x^4^2}{(x^4^3)^2} \end{align*} |

1. En los problemas 1-10, encuentre dy/dx.[**(Zill et al., 2011, p. 142)**](https://www.zotero.org/google-docs/?tX82IM)

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| **(E5.)**  **\begin{align*} y&=\frac{10}{x^2+1} \end{align*}** | **(E6.)**  **\begin{align*} y&=\frac{5}{4x-3} \end{align*}** |
| **Solution:**  **\begin{align*} y&=\frac{10}{x^2+1} \\y'&=\frac{(10)'(x^2+1)-(10)(x^2+1)'}{(x^2+1)^2} \\y'&=\frac{20x}{(x^2+1)^2} \end{align*}** | **\begin{align*} y&=\frac{5}{4x-3} \\y'&=\frac{(5)'(4x-3)-(5)(4x-3)'}{(4x-3)^2} \\y'&=\frac{20}{(4x-3)^2} \end{align*}** |
| **(E7.)**  **\begin{align*} y&=\frac{3x+1}{2x-5}  \end{align*}** | **(E8.)**  **\begin{align*} y&=\frac{2-3x}{7-x}  \end{align*}** |
| **Solution:**  **\begin{align*} y&=\frac{3x+1}{2x-5} \\y'&=\frac{(3x+1)'(2x-5)-(3x+1)(2x-5)'}{(2x-5)^2} \\y'&=\frac{3(2x-5)-(3x+1)2}{(4x-3)^2} \\y'&=\frac{6x-15-6x-2}{(4x-3)^2} \\y'&=-\frac{17}{(4x-3)^2} \end{align*}** | **\begin{align*} y&=\frac{2-3x}{7-x} \\y'&=\frac{(2-3x)'(7-x)-(2-3x)(7-x)'}{(7-x)^2} \\y'&=\frac{-3(7-x)-(3x+1)-1}{(7-x)^2} \\y'&=\frac{-21+3x+3x+1}{(7-x)^2} \\y'&=-\frac{6x-20}{(7-x)^2} \end{align*}** |
| **(E9.)**  **\begin{align*} y&=(6x-1)^2   \end{align*}** | **(E10.)**  **\begin{align*} y&=(x^4+5x)^2   \end{align*}** |
| **Solution:**  **\begin{align*} y&=(6x-1)^2 \\y'&= 36x^2-12x+1 \\y'&=72x-12  \end{align*}** | **Solution:**  **\begin{align*} y&=(x^4+5x)^2 \\y'&= x^8+10x^5+25x^2 \\y'&=8x^7+50x^4+50x  \end{align*}** |

1. En los problemas 11-20, encuentre f’ (x).

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| **(E11.)**  **\begin{align*} f(x)&=(\frac{1}{x}-\frac{4}{x^3})(x^3-5x-1)  \end{align*}** | **(E13.)**  **\begin{align*} f(x)&=\frac{x^2}{2x^2+x+1}  \end{align*}** |
| **Solution:**  **\begin{align*} f(x)&=(\frac{1}{x}-\frac{4}{x^3})(x^3-5x-1) \\f(x)'&= (\frac{1}{x}-\frac{4}{x^3})'(x^3-5x-1)+ (\frac{1}{x}-\frac{4}{x^3})(x^3-5x-1)' \\f(x)'&= \frac{13}{x^4}(x^3-5x-1)+ (\frac{1}{x}-\frac{4}{x^3})(3x^2-5) \end{align*}** | **Solution:**  **\begin{align*} f(x)&=\frac{x^2}{2x^2+x+1} \\f(x)'&=\frac{(x^2)'(2x^2+x+1)-(x^2)(2x^2+x+1)'}{(2x^2+x+1)^2} \\f(x)'&=\frac{2x(2x^2+x+1)-x^2(4x+1)}{(2x^2+x+1)^2} \\f(x)'&=\frac{4x^3+2x^2+2x-4x^3-x^2}{(2x^2+x+1)^2} \\f(x)'&=\frac{x^2+2x}{(2x^2+x+1)^2} \end{align*}** |
| **(E15.)**  **\begin{align*} f(x)&=(x+1)(2x+1)(3x+1)  \end{align*}** |  |
| **Solution:**  **\begin{align*} f(x)&=(x+1)(2x+1)(3x+1) \\f(x)'&=(x+1)(2x+1)(3x+1)'+(3x+1)(x+1)(2x+1)' \\f(x)'&=(x+1)(2x+1)3+(3x+1)[4x+3] \end{align*}** |  |

1. In Exercises 9–18, write the function in the form y = ƒ(u) and u = g(x). Then find dy/dx as a function of x. [**(Hass et al., 2018, p. 145)**](https://www.zotero.org/google-docs/?5P4MKs)

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| **(E9.)**  **\begin{align*}  y&=(2x+1)^5   \end{align*}** | **(E10.)**  **\begin{align*}  y&=(4-3x)^9 \end{align*}** |
| **Solution:**  **\begin{align*}  y&=(2x+1)^5 \\y'&= 5(2x+1)^4*(2) \\&=10(2x+1)^4  \end{align*}** | **Solution:**  **\begin{align*}  y&=(4-3x)^9 \\y'&= 9(4-3x)^8*(-3) \\&=-27(4-3x)^8  \end{align*}** |
| **(E11.)**  **\begin{align*}  y&=(1-\frac{x}{7})^-^7  \end{align*}** | **(E13.)**  **\begin{align*}  y&=(\frac{x^2}{8}+x-\frac{1}{x})^4  \end{align*}** |
| **Solution:**  **\begin{align*}  y&=(1-\frac{x}{7})^-^7 \\y'&=-7(1-\frac{x}{7})^-^8*\frac{1}{7} \\&=-(1-\frac{x}{7})^-^8 \end{align*}** | **Solution:**  **\begin{align*}  y&=(\frac{x^2}{8}+x-\frac{1}{x})^4 \\y'&=4(\frac{x^2}{8}+x-\frac{1}{x})^3*(\frac{2x}{64}+1+\frac{1}{x^2}) \end{align*}** |
| **(E14.)**  **\begin{align*}  y&=\sqrt{3x^2-4x+6}  \end{align*}** | **(E17.)**  **\begin{align*}  y&=tan^3x \end{align*}** |
| **Solution:**  **\begin{align*}  y&=\sqrt{3x^2-4x+6} \\y'&=\frac{1}{2\sqrt{3x^2-4x+6}}*(6x-4) \\&=\frac{6x-4}{2\sqrt{3x^2-4x+6}}  \end{align*}** | **Solution:**  **\begin{align*}  y&=tan^3x \\y'&=3(tan^2x)*sec^2x \end{align*}** |

1. Find Exercises 59–64.

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| **(E59.)**  **\begin{align*} y&=(1+\frac{1}{x})^3 \end{}** | **(E60.)**  **\begin{align*} y&=(1-\sqrt{x})^-^1  \end{}** |
| **Solution:**  **\begin{align*} y&=(1+\frac{1}{x})^3 \\y'&=3(1+\frac{1}{x})^2*(\frac{1}{x^2}) \end{}** | **Solution:**  **\begin{align*} y&=(1-\sqrt{x})^-^1 \\y'&=(\frac{1}{1-\sqrt{x}})'(1-\sqrt{x}) \\y'&=\frac{(1)'(1-\sqrt{x})-(1)(1-\sqrt{x})'}{(1-\sqrt{x})^2} \\&=\frac{1}{2\sqrt{x}(1-\sqrt{x})^2} \end{}** |
| **(E63.)**  **\begin{align*} y&=x(2x+1)^4 \end{}** | **(E64.)**  **\begin{align*} y&=x^2(x^3-1)^5 \end{}** |
| **Solution:**  **\begin{align*} y&=x(2x+1)^4 \\y'&=(x)'(2x+1)^4+(x)(2x+1)'^4 \\&=(2x+1)^4+(x)3(2x+1)(2) \end{}** | **Solution:**  **\begin{align*} y&=x^2(x^3-1)^5 \\y'&=2x(x^3-5)^5+(x^2)5(x^3-1)^4(3x^2) \end{}** |

**Referencias:**

* [Hass, J., Heil, C., Weir, M.D. (Eds.), 2018. Thomas’ calculus, Fourteenth edition. ed. Pearson, Boston.](https://www.zotero.org/google-docs/?i5wUUG)
* [Zill, D.G., Wright, W.S., Villagm̤ez Vels̀quez, H., Nagore Cz̀ares, G., 2011. Cl̀culo: trascendentes tempranas.](https://www.zotero.org/google-docs/?i5wUUG)