## *ESERCIZI PROPOSTI*

*Calcolare le derivate delle seguenti funzioni polinomiali:*

$y = 3x^2 + 1$ $[6x]$

$y = 5x + 7$ $[5]$

$y = 2x - 5$ $[2]$

$y = 3x^2 - 6x + 4$ $[6x - 6]$

$y = 4x^3 - 2x^2 + 5x - 3$ $[12x^2 - 4x + 5]$

$y = 4x^2 - 1$ $[8x]$

$y = 1 + x + x^2$ $[1 + 2x]$

$y = x^3 - 2x$ $[3x^2 - 2]$

$y = 3x - 1$ $[3]$

$y = 4x^2$ $[8x]$

$y = 4x^2 + 5$ $[8x]$

$y = x^5 + 4x^2$ $[5x^4 + 8x]$

$y = x^3 + 2x^2 + 1$ $[3x^2 + 4x]$

$y = 3x^4 - 5x^3 + 4x - 7$ $[12x^3 - 15x^2 + 4]$

$y = 8x^5 - 24x^3 + 7$ $[40x^4 - 72x^2]$

$y = \frac{1}{2}x^2 + \frac{1}{3}x^3 + 5x + 9$ $[x + x^2 + 5]$

$y = (2x + 3)(x^2 + 3x - 1)$ $[6x^2 + 18x + 7]$

$y = (x^2 - 1)(5x + 2)$ $[15x^2 + 4x - 5]$

$y = (x^2 + 1)^5$ $[10x(x^2 + 1)^4]$

$y = \frac{5x^3}{4} - \frac{7x^2}{2} - \frac{3x}{5} + 9$ $\left[\frac{15}{4}x^2 - 7x - \frac{3}{5}\right]$

$y = x(x - 1)^3$ $[-(2x + 1)(x - 1)^2]$

$y = (1 + x^2)(2x - 5)$ $[6x^2 - 10x + 2]$

$y = (2x - 1)^2(3 - 7x)^5$ $[(2x - 1)(3 - 7x)^4(-98x + 47)]$

$y = (2x + 3)(x^2 + 3x - 1)$ $[6x^2 + 18x + 7]$

$y = (1 - 2x^2)(3x + 1)$ $[-18x^2 - 4x + 3]$

$y = (3 - 2x - x^2)(x^4 - 2x^2)$ $[2x(-3x^4 - 5x^3 + 10x^2 + 6x - 6)]$

$y = x^2(4 + x)(5x + 1)$ $[x(20x^2 + 63x + 8)]$

$y = (8x - 1)^{10}$ $[80(8x - 1)^9]$

$y = (x - 1)^2(x - 2)$ $[(x - 1)(3x - 5)]$

$y = (5 + x^3)(1 - 2x - 4x^3)^2$ $[(1 - 2x - 4x^3)(-36x^5 - 10x^3 - 117x^2 - 20)]$

$y = (1 - 3x)^4(1 + x)$ $[(11 + 15x)(3x - 1)^3]$

$y = (2 - x)^2(x^3 + 2x)$ $[(2 - x)(-5x^3 + 6x^2 - 6x + 4)]$

$y = (x - 2)^3(x + 1)^2$ $[(x + 1)(x - 2)^2(5x - 1)]$

$y = (x^2 + x + 1)^3(x - 1)^4$ $[(x^2 + x + 1)^2(x - 1)^3(10x^2 + x + 1)]$

$y = (x^6 + 1)(3x + 1)^8$ $[6(3x + 1)^7(7x^6 + x^5 + 4)]$

$y = (x^2 + 2x - 3)^3(4 - x^2)^7$ $[2(12 + 33x - 17x^2 - 10x^3)(x^2 + 2x - 3)^2(4 - x^2)^6]$

$y = 2(x + 2)^2(x^2 + 4x - 3)$ $[4(x + 2)(2x^2 + 8x + 1)]$

$y = x^2(x^4 + 1)^3 + 3x(x^2 + 1)]$ $[2x(x^4 + 1)^2(7x^4 + 1) + 3(3x^2 + 1)]$

*Calcolare le derivate delle seguenti funzioni razionali fratte:*

$y = \frac{5}{x+1}$ $\left[-\frac{5}{(x+1)^2}\right]$

$y = \frac{x+1}{2x}$ $\left[-\frac{1}{2x^2}\right]$

$y = \frac{x-3}{x-4}$ $\left[-\frac{1}{(x-4)^2}\right]$

$y = \frac{2x-3}{3x-4}$ $\left[\frac{1}{(3x-4)^2}\right]$

$y = \frac{x+1}{x-3}$ $\left[-\frac{4}{(x-3)^2}\right]$

$y = \frac{3x-4}{x^2-1}$ $\left[\frac{x(5-3x)}{(x^2-1)^2}\right]$

$y=\dfrac{1}{x^2-1}$ $\left[-\dfrac{2x}{\left(x^2-1\right)^2}\right]$

$y=\dfrac{4x^2+1}{x}$ $\left[\dfrac{(2x+1)(2x-1)}{x^2}\right]$

$y=\dfrac{x^2-3x-1}{x+1}$ $\left[\dfrac{x^2+2x-2}{(x+1)^2}\right]$

$y=\dfrac{(1-x)^2}{x}$ $\left[\dfrac{(x-1)(x+1)}{x^2}\right]$

$y=\dfrac{3x^2-5}{x^2-1}$ $\left[\dfrac{4x}{\left(x^2-1\right)^2}\right]$

$y=\dfrac{4x^2-5x+3}{x^2-6x+5}$ $\left[-\dfrac{19x^2-34x+7}{\left(x^2-6x+5\right)^2}\right]$

$y=\dfrac{3x^2-2x+3}{x^2-2x-1}$ $\left[-\dfrac{4\left(x^2+3x-2\right)}{\left(x^2-2x-1\right)^2}\right]$

$y=\dfrac{1}{x}$ $\left[-\dfrac{1}{x^2}\right]$

$y=\dfrac{1}{2x^2}-\dfrac{3}{x}+x^3$ $\left[\dfrac{3x^5+3x-1}{x^3}\right]$

$y=3x^2+9x+\dfrac{1}{x}$ $\left[\dfrac{6x^3+9x^2-1}{x^2}\right]$

$y=\dfrac{x^2+x^6-3x^3}{x^4}$ $\left[-\dfrac{2}{x^3}+2x+\dfrac{3}{x^2}\right]$

$y=x^3-2x-\dfrac{5}{x}+\dfrac{2}{x^3}$ $\left[3x^2-2+\dfrac{5}{x^2}-\dfrac{6}{x^4}\right]$

$y=\dfrac{2x}{3-x}$ $\left[\dfrac{6}{(3-x)^2}\right]$

$y=\dfrac{1+x^2}{4+x^2}$ $\left[\dfrac{6x}{\left(4+x^2\right)^2}\right]$

$y=\dfrac{x^2-4}{x^2+4}$ $\left[\dfrac{16x}{\left(x^2+4\right)^2}\right]$

$y=\dfrac{x^3}{4-x}$ $\left[\dfrac{2x^2(6-x)}{(4-x)^2}\right]$

$y=\dfrac{x^2+1}{5x-7}$ $\left[\dfrac{5x^2-14x-5}{(5x-7)^2}\right]$

$y=\dfrac{8x+x^5}{x+1}$ $\left[\dfrac{4x^5+5x^4+8}{(x+1)^2}\right]$

$y=\dfrac{4x^2-5}{x+1}$ $\left[\dfrac{4x^2+8x+5}{(x+1)^2}\right]$

$y=2x-\dfrac{x}{x^2+1}$ $\left[\dfrac{2x^4+5x^2+1}{\left(x^2+1\right)^2}\right]$

$y=\left(2x+\dfrac{5}{x}\right)^3$ $\left[3\left(2x+\dfrac{5}{x}\right)^2\left(2-\dfrac{5}{x^2}\right)\right]$

$y=\left(x-1-\dfrac{3}{x}\right)^4$ $\left[4\left(x-1-\dfrac{3}{x}\right)^3\left(1+\dfrac{3}{x^2}\right)\right]$

$y=\dfrac{x^2-4}{x^2+4}$ $\left[\dfrac{16x}{\left(x^2+4\right)^2}\right]$

$y=\dfrac{x^2+x+2}{x^2-1}$ $\left[\dfrac{-x^2-6x-1}{\left(x^2-1\right)^2}\right]$

$y=\dfrac{7}{\left(x^3+8\right)^2}$ $\left[-\dfrac{42x^2}{\left(x^3+8\right)^3}\right]$

$y=\dfrac{x}{x^3+x^2+2}$ $\left[\dfrac{-2x^3-x^2+2}{\left(x^3+x^2+2\right)^2}\right]$

$y=\dfrac{x^3}{2x^2-3x+1}$ $\left[\dfrac{x^2\left(2x^2-6x+3\right)}{\left(2x^2-3x+1\right)^2}\right]$

$y=x^2+2+\dfrac{x^3}{4-x}$ $\left[\dfrac{4x(8-x)}{(4-x)^2}\right]$

$y=\dfrac{x^3+x+1}{x-1}$ $\left[\dfrac{2x^3-3x^2-2}{(x-1)^2}\right]$

$y=\dfrac{3x-1}{(4-5x)^2}$ $\left[\dfrac{15x+2}{(4-5x)^3}\right]$

$y=\dfrac{4x^2-5}{x+1}$ $\left[\dfrac{4x^2+8x+5}{(x+1)^2}\right]$

$y=5\left(x^2+9\right)-\dfrac{7}{x}$ $\left[\dfrac{10x^3+7}{x^2}\right]$

$y=\left(2x+\dfrac{1}{x}\right)^3\left(x^2-1\right)$ $\left[\left(\dfrac{2x^2+1}{x}\right)^2\left(\dfrac{6x^4-x^2+1}{x^2}\right)\right]$

*Calcolare le derivate delle seguenti funzioni irrazionali:*

$y=\sqrt{x}$ $\left[\dfrac{1}{2\sqrt{x}}\right]$

$y=\sqrt[3]{x^2-7x}$ $\left[\dfrac{2x-7}{\sqrt[3]{\left(x^2-7x\right)^2}}\right]$

$y=\sqrt{x^2+2}$ $\left[\dfrac{x}{\sqrt{x^2+2}}\right]$

$y=\sqrt{4x^2-3}$ $\left[\dfrac{4x}{\sqrt{4x^2-3}}\right]$

$y=\sqrt{x^3-4x+2}$ $\left[\dfrac{3x^2-4}{2\sqrt{x^3-4x+2}}\right]$

$y=\sqrt{x^4+x^2-2x}$ $\left[\dfrac{2x^3+x-1}{\sqrt{x^4+x^2-2x}}\right]$

$y=(x-1)\sqrt{x^2+1}$ $\left[\frac{2x^2-x+1}{\sqrt{x^2+1}}\right]$

$y=\frac{1}{\sqrt{1-x^2}}$ $\left[\frac{x}{\sqrt{(1-x^2)^3}}\right]$

$y=\sqrt[5]{5x+3}$ $\left[\frac{1}{\sqrt[5]{(5x+3)^4}}\right]$

$y=\sqrt[3]{4x^3+6x^2-5}$ $\left[\frac{4x(x+1)}{\sqrt[3]{(4x^3+6x^2-5)^2}}\right]$

$y=\frac{\sqrt{x}}{x+2}$ $\left[\frac{2-x}{2\sqrt{x}(x+2)^2}\right]$

$y=\sqrt[5]{(2x^3+1)^2}$ $\left[\frac{12x^2}{5\sqrt[5]{(2x^3+1)^3}}\right]$

$y=8x+\sqrt{x}$ $\left[8+\frac{1}{2\sqrt{x}}\right]$

$y=\sqrt{x^2+1}-\sqrt{x-1}$ $\left[\frac{x}{\sqrt{x^2+1}}-\frac{1}{2\sqrt{x-1}}\right]$

$y=2\sqrt{x}+2x+1$ $\left[\frac{1}{\sqrt{x}}+2\right]$

$y=\left(x^2+2\sqrt{x}\right)^5$ $\left[5\left(x^2+2\sqrt{x}\right)^4\left(2x+\frac{1}{\sqrt{x}}\right)\right]$

$y=2\sqrt{x^3}-\frac{7}{\sqrt[7]{x}}+4\sqrt[4]{x^3}$ $\left[3\sqrt{x}+\frac{1}{\sqrt[7]{x^8}}+\frac{3}{\sqrt[4]{x}}\right]$

$y=\sqrt[4]{x}-\frac{1}{\sqrt[4]{x}}$ $\left[\frac{\sqrt{x}+1}{4x\sqrt[4]{x}}\right]$

$y=x^7-3\sqrt[3]{x}+\frac{1}{\sqrt[4]{x^3}}$ $\left[7x^6-\frac{1}{\sqrt[3]{x^2}}-\frac{3}{4x\sqrt[4]{x^3}}\right]$

$y=\dfrac{2x-1}{\sqrt{x^2+1}}$ $\left[\dfrac{x+2}{\sqrt{\left(x^2+1\right)^3}}\right]$

$y=\dfrac{1}{x+\sqrt{x^2-1}}$ $\left[1-\dfrac{x}{\sqrt{x^2-1}}\right]$

$y=\dfrac{x-1}{\sqrt{x^2-1}}$ $\left[\dfrac{1}{(x+1)\sqrt{x^2-1}}\right]$

$y=\dfrac{1}{x}-\dfrac{4}{x^2}+\sqrt{x}-5\sqrt[3]{x^2}$ $\left[-\dfrac{1}{x^2}+\dfrac{8}{x^3}+\dfrac{1}{2\sqrt{x}}-\dfrac{10}{3\sqrt[3]{x}}\right]$

$y=8\sqrt{x}-7\sqrt[3]{x^2}$ $\left[\dfrac{4}{\sqrt{x}}-\dfrac{14}{3}\cdot\dfrac{1}{\sqrt[3]{x}}\right]$

$y=4\sqrt{x}+16\sqrt[4]{x}$ $\left[\dfrac{2\sqrt{x}+4\sqrt[4]{x}}{x}\right]$

$y=25x^2+\dfrac{1}{\sqrt{x}}-7$ $\left[50x-\dfrac{1}{2x\sqrt{x}}\right]$

$y=\sqrt{2}\,x^3-4\sqrt[5]{x}+25$ $\left[3\sqrt{2}x^2-\dfrac{4}{5\sqrt[5]{x^4}}\right]$

$y=x\sqrt[3]{x^2-1}$ $\left[\dfrac{5x^2-3}{3\sqrt[3]{\left(x^2-1\right)^2}}\right]$

$x+\dfrac{2}{\sqrt{x}}+\dfrac{5}{\sqrt[5]{x}}$ $\left[\dfrac{x^2-\sqrt{x}-\sqrt[5]{x^4}}{x^2}\right]$

$y=\dfrac{x^4+4x}{\sqrt{x}}$ $\left[\dfrac{7}{2}x^2\sqrt{x}+\dfrac{2}{\sqrt{x}}\right]$

$y=2x\sqrt{x}-\dfrac{1}{4}\sqrt[3]{x\sqrt{x}}+2x^6-3$ $\left[3\sqrt{x}-\dfrac{1}{8\sqrt{x}}+12x^5\right]$

$y=\dfrac{\sqrt[3]{x}\cdot\sqrt[5]{x^2}}{x\sqrt{x}}$ $\left[-\dfrac{23}{30x\sqrt[30]{x^{23}}}\right]$

$y=\dfrac{1+\sqrt[4]{x^3}}{1-\sqrt[4]{x^3}}$ $\left[\dfrac{3}{2\sqrt[4]{x}\left(1-\sqrt[4]{x^3}\right)^2}\right]$

$y=\dfrac{2-\sqrt[3]{x^2}}{2+\sqrt[3]{x^2}}$ $\left[-\dfrac{8}{3\sqrt[3]{x}\left(2+\sqrt[3]{x^2}\right)^2}\right]$

$y=\dfrac{x^3+\sqrt{x}}{x^2+3}$ $\left[x^4+9x^2-\dfrac{3}{2}x\sqrt{x}+\dfrac{3}{2\sqrt{x}}\right]$

$y=\left(15x^2-12x+8\right)\sqrt{(x+1)^3}$ $\left[\dfrac{105}{2}x^2\sqrt{x+1}\right]$

$y=\left(\sqrt[3]{x}-\dfrac{1}{2}x^2+\sqrt[5]{x^3}\right)^2$ $\left[2\left(\sqrt[3]{x}-\dfrac{1}{2}x^2+\sqrt[5]{x^3}\right)\left(\dfrac{1}{3\sqrt[3]{x^2}}-x+\dfrac{3}{5\sqrt[5]{x^2}}\right)\right]$

$y=\dfrac{x-\sqrt{x^2+4}}{7x+1}$ $\left[\dfrac{\sqrt{x^2+4}-x+28}{(7x+1)^2\sqrt{x^2+4}}\right]$

$y=\dfrac{\sqrt{2-x^2}+x}{3+x}$ $\left[\dfrac{-3x-2+3\sqrt{2-x^2}}{(3+x)^2\sqrt{2-x^2}}\right]$

$y=\dfrac{3-x^2}{\sqrt[3]{x+2}}$ $\left[\dfrac{-5x^2-12x-3}{3\sqrt[3]{(x+2)^4}}\right]$

$y=\dfrac{x^5-x^3}{\sqrt{x+1}}$ $\left[\dfrac{x^2\left(9x^2-x-6\right)}{2\sqrt{x+1}}\right]$

$y=\dfrac{x}{\sqrt{x+1}}$ $\left[\dfrac{x+2}{2(x+1)\sqrt{x+1}}\right]$

$y=x\cdot\sqrt{\dfrac{1-x}{1+x}}$ $\left[-\dfrac{2x}{(1+x)^2\sqrt{\dfrac{1-x}{1+x}}}\right]$

$y=\dfrac{\sqrt{x^2-1}}{x}\left(\dfrac{1}{x^2}+2\right)$ $\left[\dfrac{-2x^4+x^2+4}{x^4\sqrt{x^2-1}}\right]$

*Calcolare le derivate delle seguenti funzioni esponenziali e logaritmiche:*

$y=ln(2x-1)$ $\left[\dfrac{2}{2x-1}\right]$

$y=ln(x+3)$ $\left[\dfrac{1}{x+3}\right]$

$y = e^{x+1}$ $[e^{x+1}]$

$y = xe^x$ $[(1+x)e^x]$

$y = e^{5-x^2}$ $\left[-2xe^{5-x^2}\right]$

$y = \dfrac{x^4+1}{e^4+1}$ $\left[\dfrac{4x^3}{e^4+1}\right]$

$y = xlnx$ $[lnx + 1]$

$y = x^2lnx + 3x$ $[2xlnx + x + 3]$

$y = e^{-\frac{3}{x^2}}$ $\left[\dfrac{2}{x^3}e^{-\frac{3}{x^2}}\right]$

$y = e^{\sqrt{x}}$ $\left[\dfrac{1}{2\sqrt{x}}e^{\sqrt{x}}\right]$

$y = \dfrac{lnx-1}{lnx+1}$ $\left[\dfrac{2}{x\left(lnx+1\right)^2}\right]$

$y = x^3e^x + e^x - 1$ $[e^x(x^3 + 3x^2 + 1)]$

$y = e^x(2 - e^x)$ $[2e^x(1 - e^x)]$

$y = e^x(x^3 - x + 7)$ $[e^x(x^3 + 3x^2 - x + 6)]$

$y = xln^3x - 3xln^2x + 6xlnx - 6x$ $[ln^3x]$

$y = x^2(lnx)^3$ $[x(lnx)^2(2lnx + 3)]$

$y = 5xln^2x - 6x^3ln^5x$ $[-18x^2ln^5x - 30x^2ln^4x + 5ln^2x + 10lnx]$

$y = \dfrac{1}{x}\cdot lnx$ $\left[\dfrac{1}{x^2}\left(1-lnx\right)\right]$

$y = (xlnx - 1)^2$ $[2(xlnx - 1)(lnx + 1)]$

$y = 3xlnx$ $[3(lnx + 1)]$

$y = x^2lnx$ $[x(2lnx + 1)]$

$y = xln^3x$ $[ln^2x(lnx + 3)]$

$y = \dfrac{1}{2}ln^2x - lnx + \sqrt{x}$ $\left[\dfrac{2lnx-2+\sqrt{x}}{2x}\right]$

$y = ln\left(x + \sqrt{4+x^2}\right)$ $\left[\dfrac{1}{\sqrt{4+x^2}}\right]$

| | |
|---|---|
| $y = ln\left(\frac{x}{x-1}\right) - \frac{2}{x} - \frac{1}{x^2}$ | $\left[\frac{x^2-2}{x^3(x-1)}\right]$ |
| $y = ln^2 x + 3x + 5$ | $\left[\frac{2lnx+3x}{x}\right]$ |
| $y = 4xln^4 x + 7x^5 ln^5 x$ | $\left[ln^3 x\left(35x^4 ln^2 x + 35x^4 lnx + 4lnx + 16\right)\right]$ |
| $y = \frac{lnx}{x^2}$ | $\left[\frac{1}{x^3}(1-2lnx)\right]$ |
| $y = x\sqrt{1+x^2} + ln\left(x+\sqrt{1+x^2}\right)$ | $\left[2\sqrt{1+x^2}\right]$ |
| $y = ln(x^2 - 7x - 8)$ | $\left[\frac{2x-7}{x^2-7x-8}\right]$ |
| $y = (x-1)ln^3 x$ | $\left[\frac{xln^3 x + 3(x-1)ln^2 x}{x}\right]$ |
| $y = e^{x^2-2x}$ | $\left[2(x-1)e^{x^2-2x}\right]$ |
| $y = xe^{\frac{x-1}{x}}$ | $\left[e^{\frac{x-1}{x}} \cdot \frac{x+1}{x}\right]$ |
| $y = ln\sqrt[5]{x^2+4}$ | $\left[\frac{2x}{5(x^2+4)}\right]$ |
| $y = ln\left(\frac{x}{x+1}\right) + \frac{1}{x} - \frac{1}{2x^2}$ | $\left[\frac{1}{x^3(x+1)}\right]$ |
| $y = ln\left(\frac{x}{x-1}\right)$ | $\left[-\frac{1}{x(x-1)}\right]$ |
| $y = ln\left(x^3 + x^2 + 8\right)$ | $\left[\frac{3x^2+2x}{x^3+x^2+8}\right]$ |
| $y = ln\sqrt[3]{4x^2+5x-1}$ | $\left[\frac{8x+5}{3(4x^2+5x-1)}\right]$ |
| $y = ln\sqrt{\frac{x^2+1}{2x+3}}$ | $\left[\frac{x^2+3x-1}{(2x+3)(x^2+1)}\right]$ |

$y=\sqrt{ln\left(x^2+4\right)}$ $\left[\frac{x}{\left(x^2+4\right)\sqrt{ln\left(x^2+4\right)}}\right]$

$y=\sqrt[3]{lnx+\sqrt{x^2+1}}$ $\left[\frac{1}{3\sqrt[3]{lnx+\sqrt{x^2+1}}}\left(\frac{1}{x}+\frac{1}{\sqrt{x^2+1}}\right)\right]$

$y=\frac{1}{x^2}ln^3\left(2x+\sqrt[5]{x}\right)$ $\left[-\frac{2}{x^3}ln^3\left(2x+\sqrt[5]{x}\right)+\frac{6}{x^2}\frac{ln^2\left(2x+\sqrt[5]{x}\right)}{2x+\sqrt[5]{x}}+\frac{1}{5\sqrt[5]{x^4}}\right]$

$y=ln\left(\frac{\sqrt{e^x}}{1+\sqrt{1+e^x}}\right)$ $\left[\frac{e^{\sqrt{x}}\left(2\sqrt{1+e^x}+e^x+2\right)}{4\sqrt{1+e^x}}\right]$

$y=\frac{lnx-1}{lnx+1}$ $\left[\frac{2}{x\left(lnx+1\right)^2}\right]$

$y=\frac{e^x+1}{2-e^x}$ $\left[\frac{3e^x}{\left(2-e^x\right)^2}\right]$

$y=\frac{e^x}{x^3+x^2}$ $\left[\frac{e^x\left(x^3-2x^2-2x\right)}{\left(x^3+x^2\right)^2}\right]$

$y=\frac{lnx}{1+lnx}$ $\left[\frac{1}{x\left(1+lnx\right)}\right]$

$y=ln\left(lnx\right)$ $\left[\frac{1}{xlnx}\right]$

$y=ln\left(e^x-2\right)$ $\left[\frac{e^x}{e^x-2}\right]$

$y=ln\left(5e^x\sqrt{x^2-1}\right)$ $\left[\frac{x^2+x-1}{x^2-1}\right]$

$y=\frac{1}{2}ln\left(x^2-1\right)+x$ $\left[\frac{x^2+x-1}{x^2-1}\right]$