

Ricordando le seguenti formule di derivazione:

$$Dx^n = nx^{n-1},$$

$$D\sqrt[n]{x} = \frac{1}{n\sqrt[n]{x^{n-1}}},$$

$$Dkf(x) = kf'(x),$$

la regola di derivazione di una **somma**:

$$D[f(x) + g(x)] = Df(x) + Dg(x),$$

derivare le seguenti **funzioni razionali e irrazionali intere**, dimostrando che:

1. a) $D(2x^3 - 3x) = 6x^2 - 3;$ b) $Dx(x + 1) = 2x + 1;$ c) $D(2x^{-4} + 5) = -\frac{8}{x^5}.$
2. a) $D\left(\frac{x^4}{a} - \frac{x^2}{b}\right) = \frac{4x^3}{a} - \frac{2x}{b};$ b) $D\frac{bx + c}{a} = \frac{b}{a};$ c) $D\left(\frac{x^5}{5} - \frac{2x^3}{3} + x\right) = x^4 - 2x^2 + 1.$
3. a) $D(x^5 - 4x^3 + 2x - 3) = 5x^4 - 12x^2 + 2;$ b) $D(5x^2 - 10x + 9) = 10x - 10;$
c) $D\left(\frac{-5x^3}{a}\right) = -\frac{15x^2}{a};$ d) $D(3x - 6\sqrt{x}) = 3\left(1 - \frac{1}{\sqrt{x}}\right).$
4. a) $D\left(\frac{1}{3}x^{3n} - \frac{1}{2}x^{2n}\right) = nx^{3n-1} - nx^{2n-1};$ b) $D\left(\frac{3}{x^2} - \frac{4}{x}\right) = \frac{4x - 6}{x^3};$ c) $D\frac{1}{x^n} = -\frac{n}{x^{n+1}}.$
5. a) $D\left(\frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3}\right) = -\frac{x^2 + 2x + 3}{x^4};$ b) $D\left(x + \frac{1}{x^2} - \frac{1}{5x^5}\right) = \left(1 - \frac{1}{x^3}\right)^2.$
6. a) $D\frac{x^5 - 2x^3 + x^2 - 2x + 1}{x^3} = \frac{2x^5 - x^2 + 4x - 3}{x^4};$ b) $D(2x^{\frac{3}{2}} - 3x^{\frac{2}{3}} + 6x^{\frac{1}{3}}) = \frac{3x\sqrt{x} - 2\sqrt[3]{x} + 2}{\sqrt[3]{x^2}};$
c) $D(4x^{-\frac{1}{2}} + 3x^{-\frac{2}{3}}) = \dots$
7. a) $D(6x^{\frac{4}{3}} + 5x^{\frac{6}{5}} + 2x^{\frac{3}{2}}) = 8\sqrt[3]{x} + 6\sqrt[5]{x} + 3\sqrt{x};$ b) $D(2\sqrt{x} + 3\sqrt[3]{x} + 4\sqrt[4]{x}) = \frac{\sqrt{x} + \sqrt[3]{x} + \sqrt[4]{x}}{x}.$
8. $D\left(\frac{5}{2}\sqrt[5]{x^4} - \frac{3}{4}\sqrt[3]{x^2} + \frac{5}{2\sqrt[5]{x^2}} + 8\sqrt{x}\right) = \frac{2}{\sqrt[5]{x}} - \frac{1}{2\sqrt[3]{x}} - \frac{1}{x\sqrt[5]{x^2}} + \frac{4}{\sqrt{x}}.$
9. $D\left(10\sqrt[5]{x^3} - 9\sqrt[3]{x} + \frac{12}{\sqrt[4]{x^3}} - \frac{6}{\sqrt{x}}\right) = \frac{6}{\sqrt[5]{x^2}} - \frac{3}{\sqrt[3]{x^2}} - \frac{9}{x\sqrt[4]{x^3}} + \frac{3}{x\sqrt{x}}.$
10. a) $D(2x^{\frac{3}{2}} - 7x^{-\frac{1}{7}} + 4x^{\frac{3}{4}}) = 3x^{\frac{1}{2}} + x^{-\frac{8}{7}} + 3x^{-\frac{1}{4}};$ b) $D\left(\frac{ax^3}{\sqrt{x}} - \frac{b}{x\sqrt{x}} + \frac{c}{\sqrt{x}}\right) = \frac{5ax^4 - cx^2 + 3b}{2x^2\sqrt{x}}.$