CALCOLO DI DERIVATE

(A)

1) $y = x^5 - 3x^2 + 2\frac{\sqrt{x}}{\sqrt[5]{x}}$ $\quad y = x^5 - 3x^2 + 2x^{\frac{1}{2}-\frac{1}{5}}$; $y = x^5 - 3x^2 + 2x^{\frac{3}{10}}$

$y' = 5x^4 - 6x + 2\cdot\frac{3}{10}x^{\frac{3}{10}-1}$; $y' = 5x^4 - 6x + \frac{3}{5}\cdot\frac{1}{\sqrt[10]{x^7}}$

2) $y = 5x^2 + x\cos x$ $\quad y' = 10x + \cos x - x\operatorname{sen} x$

3) $y = x^2 e^x + 3$ $\quad y' = 2xe^x + x^2e^x = e^x(2x + x^2)$

4) $y = (x^2-2)^3$ $\quad y' = 3(x^2-2)^2 \cdot 2x = 6x(x^2-2)^2$

5) $y = x^2 e^{-x}$ $\quad y' = 2xe^{-x} + x^2\cdot(-1)\cdot e^{-x} = e^{-x}(2x - x^2) = xe^{-x}(2-x)$

6) $y = x^3(4-x^2)^2$ $\quad y' = 3x^2(4-x^2)^2 + x^3\cdot 2(4-x^2)(-2x) = (4-x^2)\left[3x^2(4-x^2) - 4x^4\right]$

$= x^2(4-x^2)(12 - 7x^2)$

7) $y = \frac{\sqrt[3]{x^2}}{\sqrt{x}} = x^{\frac{2}{3}-\frac{1}{2}} = x^{\frac{1}{6}}$ $\quad y' = \frac{1}{6}x^{\frac{1}{6}-1} = \frac{1}{6}x^{-\frac{5}{6}} = \frac{1}{6\sqrt[6]{x^5}}$

8) $y = (2\sqrt{x}-1)(x^3-4)$ $\quad y' = \left(2\cdot\frac{1}{2\sqrt{x}}\right)(x^3-4) + (2\sqrt{x}-1)(3x^2) = \frac{(x^3-4)}{\sqrt{x}} + 3x^2(2\sqrt{x}-1) \ldots$

9) $y = \frac{2x^2 - x}{x^2+4x}$ $\quad y' = \frac{(4x-1)(x^2+4x) - (2x^2-x)(2x+4)}{(x^2+4x)^2} =$

$= \frac{4x^3 + 16x^2 - x^2 - 4x - 4x^3 - 8x^2 + 2x^2 + 4x}{x^2(x+4)^2} = \frac{9x^2}{x^2(x+4)^2} = \frac{9}{(x+4)^2}$

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

$y' = \frac{-2(3x^2+4)}{(x^3+4x+2)^3}$

11) $y = xe^x \ln x$ $\quad y' = e^x \ln x + xe^x \ln x + xe^x\cdot\frac{1}{x} = e^x(\ln x + x\ln x + 1)$