Answer on Question# #47295 – Mathematics – Differential Calculus | Equations

Question:

Power of x is 4+x square +1 – differentiate it w.r.t x.

Solution:

$$y(x) = x^{(4+x)^2+1}. \quad (1)$$

Let us take the natural logarithm of left and right sides of this function:

$$lny = ((4+x)^2+1)lnx. \quad (2)$$

Differentiating both sides, we have

$$\frac{y'}{y} = \big(2(4+x)\big)lnx + \frac{(4+x)^2+1}{x}, \quad (3)$$

where $y' = \frac{dy}{dx}$. Multiplying the expression (3) by the original function *y,* we finally obtain:

$$y' = y\left[\big(2(4+x)\big)lnx + \frac{(4+x)^2+1}{x}\right] = \frac{x^{(4+x)^2+1}}{x}\left[\big(2(4+x)\big)xlnx + (4+x)^2+1\right]$$
$$= x^{(4+x)^2}\,(x^2+8x+2(4+x)xlnx+17)$$

Answer: $y' = x^{(4+x)^2}\,(x^2+8x+2(4+x)xlnx+17)$.