Answer on Question #47291 – Math – Calculus

Question:

y=(1-x square+x cube)*(3x+6) differentiate it w.r.t x

Solution:

$y = (1 - x^2 + x^3) \cdot (3x + 6)$ Derivative:

$\frac{d}{dx}((3x + 6)(x^3 - x^2 + 1))$

Use the product rule
$\frac{d(u\,v)}{dx} = \frac{d\,u}{dx}\,v + u\,\frac{d\,v}{dx}$,
where $u = 3x + 6$ and $v = x^3 - x^2 + 1$.

$= (x^3 - x^2 + 1)\,\frac{d}{dx}(3x + 6) + (3x + 6)\,\frac{d}{dx}(x^3 - x^2 + 1)$

The derivative of a sum is the sum of the derivatives.

$= (x^3 - x^2 + 1)\left(\frac{d}{dx}(6) + \frac{d}{dx}(3x)\right) + (3x + 6)\left(\frac{d}{dx}(x^3) + \frac{d}{dx}(-x^2) + \frac{d}{dx}(1)\right)$

The derivative of the constant 6 is 0.

$= (x^3 - x^2 + 1)\,\frac{d}{dx}(3x) + (3x + 6)\left(\frac{d}{dx}(x^3) + \frac{d}{dx}(-x^2) + \frac{d}{dx}(1)\right)$

The derivative of a constant times a function is
the constant times the derivative of the function.

$= 3(x^3 - x^2 + 1)\,\frac{d}{dx}(x) + (3x + 6)\left(\frac{d}{dx}(x^3) - \frac{d}{dx}(x^2) + \frac{d}{dx}(1)\right)$

The derivative of x^n is $n\,x^{n-1}$.

$= (3x + 6)\left(\frac{d}{dx}(1) + 3x^2 - 2x\right) + 3(x^3 - x^2 + 1)$

The derivative of the constant 1 is 0.

$= (3x + 6)(3x^2 - 2x) + 3(x^3 - x^2 + 1)$

Simplify.

$= 3(4x^3 + 3x^2 - 4x + 1)$

Answer:

$$y' = 3 \cdot (4x^3 + 3x^2 - 4x + 1)$$