$$(x+h)^2 = x^2 + 2xh + h^2$$

$$(x+h)^3 = x^3 + 3x^2h + 3xh^2 + h^3$$

$$(x+h)^0 = 1$$

$$(x+h)^1 = x+h$$

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$$(x+h)^0 = 1$$

$$(x+h)^1 = 1x^1h^0 + 1x^0h^1$$

$$(x+h)^2 = 1x^2h^0 + 2x^1h^1 + 1x^0h^2$$

$$(x+h)^3 = 1x^3h^0 + 3x^2h^1 + 3x^1h^2 + 1x^0h^3$$

$$(x+h)^0 = 1$$

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$$(x+h)^2 = 1x^2h^0 + 2x^1h^1 + 1x^0h^2$$

$$(x+h)^3 = 1x^3h^0 + 3x^2h^1 + 3x^1h^2 + 1x^0h^3$$

$$(x+h)^4 = 1x^4h^0 + 4x^3h^1 + 6x^2h^2 + 4x^1h^3 + 1x^0h^4$$

$$(x+h)^0 = 1$$

$$(x+h)^1 = 1x^1h^0 + 1x^0h^1$$

$$(x+h)^2 = 1x^2h^0 + 2x^1h^1 + 1x^0h^2$$

$$(x+h)^3 = 1x^3h^0 + 3x^2h^1 + 3x^1h^2 + 1x^0h^3$$

$$(x+h)^4 = 1x^4h^0 + 4x^3h^1 + 6x^2h^2 + 4x^1h^3 + 1x^0h^4$$

$$\vdots$$

$$(x+h)^n = 1x^nh^0 + nx^{n-1}h^1 + (?)x^{n-2}h^2 + (?)x^{n-3}h^3 + \cdots + h^n$$

$$(x+h)^n = 1x^n + nx^{n-1}h^1 + bx^{n-2}h^2 + cx^{n-3}h^3 + \cdots + h^n$$

$$(x+h)^n = x^n + nx^{n-1}h^1 + bx^{n-2}h^2 + cx^{n-3}h^3 + \cdots + h^n$$
$$(x+h)^n - x^n = nx^{n-1}h^1 + bx^{n-2}h^2 + cx^{n-3}h^3 + \cdots + h^n$$

$$\frac{(x+h)^n - x^n}{h} = \frac{nx^{n-1}h^1 + bx^{n-2}h^2 + cx^{n-3}h^3 + \cdots + h^n}{h}$$

$$\begin{aligned}\frac{(x+h)^n - x^n}{h} &= \frac{nx^{n-1}h^1 + bx^{n-2}h^2 + cx^{n-3}h^3 + \cdots + h^n}{h} \\ &= nx^{n-1} + bx^{n-2}h + cx^{n-3}h^2 + \cdots h^{n-1}\end{aligned}$$

If $f(x) = x^n$ then $f'(x)$ is given by:

$$\lim_{h \to 0} \frac{(x+h)^n - x^n}{h}$$

If $f(x) = x^n$ then $f'(x)$ is given by:

$$\lim_{h \to 0} \left(nx^{n-1} + bx^{n-2}h + cx^{n-3}h^2 + \cdots h^{n-1} \right)$$

If $f(x) = x^n$ then $f'(x)$ is given by:

$$f'(x) = nx^{n-1}$$