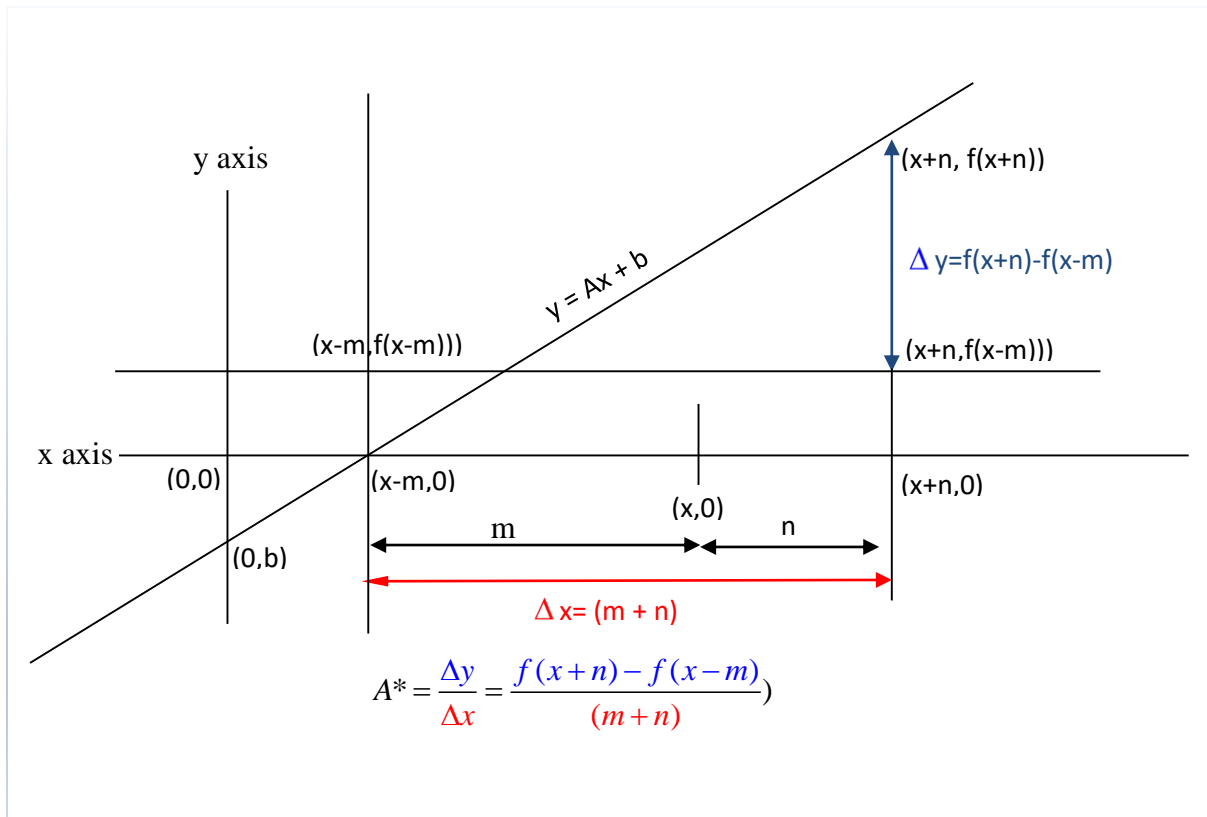


Here's a diagram of John's characterization of the derivative, as near as I can figure out what he is doing:



Note that A^* (John's equation for the slope A) is wrong; the correct version (using his characterization) would be:

Note that this is just the equation of a line given two points of an arbitrary function; it says nothing about the general form of the function $f(x)$, and is only valid IF one can assure that the function derivative between the two points is in fact a straight line, and is not curved between the two given points, whatever m and n are.

Further, there is no prescription for the derivative outside the two points, (changing x will just translate the diagram along the x axis), unless it is the same straight line.

Note that setting $m = 0$ gives:

$$A = \left(\frac{f(x+n) - f(x)}{n} \right),$$

which is the correct slope for A , assuming the derivative is a straight line between x and n .

One can remove this assumption by assuming that a curved function derivative becomes "linear enough" in the limit for n small enough:

$$f'(x) = \lim_{n \rightarrow 0} \left(\frac{f(x+n) - f(x)}{n} \right)$$

