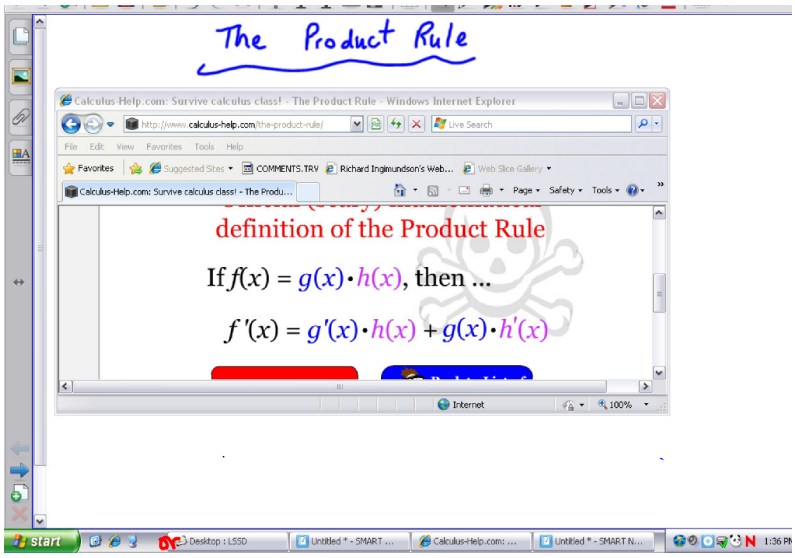
The Product Rule



OR easier

$f'(x) = uv' + u'v$

ex. 1 Find the derivative.

a) $f(x) = x^2(x+1)$

$= x^3 + x^2$

$f'(x) = 3x^2 + 2x$

OR

Using the product rule $f'(x) = u'v + v'u$

$f'(x) = 2x(x+1) + (1)(x^2)$

$= 2x^2 + 2x + x^2$

$= 3x^2 + 2x$

b) $f(x) = (2x^3+3)(x^4-2x)$

$f'(x) = 6x^2(x^4 - 2x) + (4x^3 - 2)(2x^3 + 3)$

$= 6x^6 - 12x^3 + 8x^6 + 12x^3 - 4x^3 - 6$

$f'(x) = 14x^6 - 4x^3 - 6$

c) $f(t) = \sqrt{t}(1-t)$

$= t^{\frac{1}{2}}(1-t)$

$f'(t) = \frac{1}{2}t^{-\frac{1}{2}}(1-t) + (-1)(t^{\frac{1}{2}})$

$= \frac{1}{2}t^{-\frac{1}{2}} - \frac{1}{2}t^{\frac{1}{2}} - t^{\frac{1}{2}}$

$= \frac{1}{2}t^{-\frac{1}{2}} - \frac{3}{2}t^{\frac{1}{2}}$

$u = t^{\frac{1}{2}}$, $u' = \frac{1}{2}t^{-\frac{1}{2}}$, $v = 1-t$, $v' = -1$, then sub $uv' + v'u$

Note: Both b) and c) could have been done using the distributive property and the power rule!

ex. 2 Find an eqn. for the line tangent to the curve $y = x^2$ at the point $(2, 4)$

$y = x^2$

$\frac{dy}{dx} = 2x$

at $x = 2$, $m = 2(2) = 4$

$y - y_1 = m(x - x_1)$

$y - 4 = 4(x-2)$

or $y - 4 = 4x - 8$

$0 = 4x - y - 4$

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