Differentiate these

Like when playing noughts and crosses, complete a whole row, column or diagonal.

$y = (3x + 1)^2$	$y = (2x^2 + 5)^3$	$y = (x^3 + 4)^3$
$y = (7x - 3)^2$	$y = (5x^2 - 4)^3$	$y = (7x^3 - 1)^5$
$y = (5x + 11)^2$	$y = (3x^2 + 9x)^3$	$y = (4x^3 + 9x)^7$

Deduce an easier method (other than brute force expanding, differentiating and factorising) for differentiating these equations.

Differentiate these - answers

Like when playing noughts and crosses, complete a whole row, column or diagonal.

$y = (3x + 1)^2$ $\frac{dy}{dx} = 6(3x + 1)$	$y = (2x^2 + 5)^3$ $\frac{dy}{dx} = 12x(2x^2 + 5)^2$	$y = (x^3 + 4)^3$ $\frac{dy}{dx} = 9x^2(x^3 + 4)^2$
$y = (7x - 3)^2$ $\frac{dy}{dx} = 14(7x - 3)$	$y = (5x^2 - 4)^3$ $\frac{dy}{dx} = 30x(5x^2 - 4)^2$	$y = (7x^3 - 1)^5$ $\frac{dy}{dx} = 105x^2(7x^3 - 1)^4$
$y = (5x + 11)^2$ $\frac{dy}{dx} = 10(5x + 11)$	$y = (3x^2 + 9x)^3$ $\frac{dy}{dx} = 3(7x^2 + 9x)^2(14x + 9)$	$y = (4x^3 + 9x)^7$ $\frac{dy}{dx} = 7(4x^3 + 9x)^6(12x^2 + 9)$ $= 21(4x^3 + 9x)^6(4x^2 + 3)$

Deduce an easier method (other than brute force expanding, differentiating and factorising) for differentiating these equations.

The Chain Rule,
or function of a function.

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$