ICM: Chain Rule

How can we find the derivative of more complex higher order functions without multiplying everything out?

EX. $(x^2+1)^5$

"inside" function: x^2+1

"outside" function: x^5

Take derivative

inside: $2x$

outside: $5x^4$

Multiply derivatives

$(2x)(5x^4)$

in out

Sub "complicated" function back in.

Inside goes into the outside function.

$2x(5(x^2+1)^4)$

Simplify. $10x(x^2+1)^4$ is the derivative.

EX. $\sqrt{2x+1}$ Find the derivative.

"in": $2x+1$

"out": $\sqrt{x}$

② "in": 2

"out": $\frac{1}{2\sqrt{x}}$

③ $\frac{2}{1} \cdot \frac{1}{2\sqrt{x}}$

④ Sub! $\frac{2}{2\sqrt{2x+1}}$

⑤ Simplify. $\boxed{\frac{1}{\sqrt{2x+1}}}$