LN(X) RULE

Differentiating ln(x) generally results in two fundamental rules. The first is if a derivative of ln (x) is needed, in which case, it can be expressed simply as 1/x. If a term is in the form of ln f(x), then it is simply f'(x)/f(x)

Find the f'(ln $|x^2$+17x+9|)

$$g(x) = \ln\left|x^2 + 17x + 9\right|$$

The lines around the second degree polynomial are simply modulus symbols. This means that values must be positive as a scalar, a property of ln. In order to do this, one would simply differentiate and then put the derivative in the numerator and the function as is in the denominator. Sometimes you can cancel, remember that terms only cancel across numerator or denominator if the operation between one term and the next is multiply and not add or subtract.

Furthermore, a resultant of this rule, is that if a function is in the form of f(x)= ln |kx|, where k is some constant, then the result after simplification is simply 1/x. Try this with a few, you can see that as the derivative of kx is k and it is divided by the product of k and x, then result can be expressed by 1/x.

Anyway, back to our worked result problem, let me differentiate the polynomial in the modulus symbols first. For this, I am going to generalise the value in the modulus after ln to be g(x).

$$f(x) = x^2 + 17x + 9$$
$$f'(x) = 2 * 1x^{2-1} + 17 * 1x^{1-1}$$

Hopefully you can see how I applied Power Rule there. I then simply substitute according to the rule described

$$\therefore g'(x) = \frac{2x + 17}{x^2 + 17x + 9}$$