**Lecture 8.**

**Some Differentiation Formulas.**

**Some differentiation formulas:**



(the derivative of a sum is the sum of the derivatives);



(the derivative of a difference is the difference of the derivatives);



(the derivative of a product is the first function times the derivative of the second plus the second function times the derivative of the first);



(the derivative of a quotient is the denominator times the derivative of the numerator minus the numerator times the derivative of the denominator; all divided by the square of the denominator);



(the derivative of a scalar multiple is the scalar multiple of the derivative);

**Logarithmic Derivative.** A logarithmic derivative of a function  is the derivative of the logarithm of this function; that is



**The derivatives of functions represented parametrically.** If a function is related to an argument $x$ by means of a parameter $t$:



then



or, in other notation



The second order derivative is defined by



The third order derivative is defined by

