***Al Basrah university  
college of Pharmacy***

***Mathematics and Statistics\ first stage***

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***Differentiation Rules***

1. ***If , where is constant , = 0***
2. ***If .***
3. ***If then for every real value of***

***.***

1. ***If .***
2. ***If .***
3. ***If , where .***

***7. If , then .***

***Derivative of higher orders:-***

***Frist order derivative of .***

***Second order derivative of .***

***Third order derivative of***

***⁞***

***⁞***

***The order derivative of***

***Examples:- Find derivative of following functions:***

1. ***.***

***.***

***= = =***

1. ***→***
2. ***→***

***.***

1. ***Find of***

***→***

1. ***let , find ?***

***Trigonomtric Functions***

***.***

***Important relations:***

***1.***

***2.***

***3.***

***4.***

***5.***

***6.***

***7.***

***8.***

***9.***

***10.***

***11.***

***12.***

***13.***

***Derivatives of Trigonomtric Functions***

***Let***

***1.***

***2.***

***3.***

***4.***

***5.***

***6.***

***Examples:- Find derivative of the following functions:-***

***.***

***2.***

***3.***

***.***

***4. Find if ?***

***5 .***

***.***

***6.***

***.***

***7.***

***.***

***8.***

***9.***

***10.***

***.***

***11.***

***Derivatives of Inverse Trigonometric Function***

***Note:-***

***1-***

***2-***

***3-***

***4-***

***5-***

***6-***

***Examples:- Find derivative of following:-***

***1.***

***2.***

***3.***

***.***

***4.***

***5.***

***Hyperbolic Functions***

***Some important relation :-***

***1-***

***2-***

***3-***

***Derivatives of Hyperbolic Functions***

***1-***

***2-***

***3-***

***4-***

***5-***

***6-***

***Examples:- Find derivative of the following functions :-***

***1-***

***2-***

***3-***

***4-***

***5-***

***.***

***The Natural Logarithm Function***

***Rules of arithmetic logarithms :- For any 0 .***

***1-***

***2-***

***3-***

***4-***

***5-***

***Derivative of Natural Logarithm Function***

***If is a differentiable function of and then the derivative of is :-***

***Examples:- Find derivative of the following functions:-***



***3.***

***.***

***4-***

***5-***

***6-***

***7-***

***.***

***The Exponential Function )***

***Exponential function :defined as the inverse of the natural logarithm function .***

***Law of exponential function ) For all real numbers and***

***1.***

***2.***

***3.***

***4. .***

***Derivative of exponential function:-***

***If is a differentiable function of nd let , then the derivative of is :-***

***Examples: Find of the following functions:***

1. ***.***
2. ***.***
3. ***.***
4. ***.***

***5.***

1. ***.***

***7.***

***8. .***

***The General Exponential Function***

***If a is a positive number, then for example .***

***Laws of exponents ():-***

***1.***

***2.***

***3.***

***4. .***

***Derivative of General Exponential Function:***

***If and is a differentiable function of then is a differentiable function of and:***

***Examples: Find of the following functions:***

***.***

***.***

***6-***

***.***