***Lecture R* − Calculus I − Review**

***Section R*.1 – Derivative**

***Constant Rule***

 *c* is constant

***Example***

Find the derivative:

1.  
2. *y* = π 
3. *g*(*w*) = 
4.  

***Power Rule***

 *n* is any real number

***Constant Times a Function***



***Example***

Find the derivative each function

1. 

***Solution***







*b.* 

***Solution***









***The Product Rule***

The derivative of the product of two differentiable functions is equal to the first function times the derivative of the second plus the second function times the derivative of the first,







***Example***

Find the derivative of 

***Solution*** 









***Example***

Find the derivative of 

***Solution***



















***Quotient Rule***





***Example***

Find the derivative of 

***Solution***

 







***Example***

Find the derivative of 

***Solution***







 

***Chain Rule***

***The General Power Rule***







***Example***

Find the derivative of 

***Solution***









***Formula*** 

***Proof***



 



***Derivatives of Trigonometric Functions***

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

***Example***

Find the derivatives

1. 







1. 





 





**Derivatives of Logarithmic**

***Derivative* of ** 

The chain rule extends: 

***Example***

Find 

***Solution***







***Example***

Find the derivative of 

***Solution***



***Derivative*** 

***Example***

* 



***Derivatives* of *Exponential* Functions**

If *u* is any differentiable function of *x*, then



***Example***

Find the derivative of 

***Solution***



***Example***

Find the derivative of 

***Solution***



***Example***

Find the derivative of 

***Solution***



***Definition***

If *a* > 0 and *u* is a differentiable of *x*, then  is a differentiable function of *x* and



***Example***

* 
* 
* 

**Derivatives of Inverse Trigonometric Functions**

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

***Example***

Find the derivative of 

***Solution***



***Example***

Find the derivative of 

***Solution***

 





***Exercises Section R*.1 – Derivative**

(**1 – 59**) Find the derivative to the following functions

|  |  |  |
| --- | --- | --- |
|  | |  |
|  | |  | | |

***Section R*.2 – Integration**

***Definition of Antiderivative***

A Function *F* is an Antiderivative of a function *f* if for every *x* in the domain of *f*, it follows that 

***Notation for Antiderivatives and indefinite integrals***

The notation



where *C* is an arbitrary constant, means that *F* is an Antiderivative of *f*.

That is  for all *x* in the domain of *f*.

 Indefinite integral

Antiderivative

Integrand

Integral sign



Differential

**Basic Integration Rules**











***The General Power Rule***

The Simple Power Rule is given by:



u3



du



***General Power Rule for Integration***

If *u* is a differentiable function of *x*, then



***Example***

Find each indefinite integral.











***Example***

Find the integral 

***Solution***

 



***Example***

Find the integral 

***Solution***

Let: 

















***Theorem* − The Fundamental Theorem of Calculus, P-2**

If *f* is continuous at every point in [*a, b*], then *F* is any antiderivative of *f* on [*a, b*], then



***Example***

1. 





1. 





1. 







**Other Indefinite Integrals**











***Example***

Evaluate 

***Solution***



***Example***

Evaluate 

***Solution***



***Example***

Evaluate 

***Solution***

 

***Exercises Section* *R*.2 − Integration**

(**1 – 17**) Find each indefinite integral.

|  |  |  |
| --- | --- | --- |
|  |  |  |

(**18 – 23**) Find the general solution of the differential equation

|  |  |
| --- | --- |
|  |  |

(**24 – 32**) Evaluate the integrals

|  |  |  |
| --- | --- | --- |
|  |  |  |