**Colorado Technical University**

**Course:** MATH205 – Differential Calculus

#### Unit 8 Part 15 Readings – Antiderivatives and Integration

**Antiderivatives**

All mathematical operations have an inverse operation to “undo” them

The inverse of taking a derivative is called reverse differentiation or "antidifferentiation"

Any solution found using antidifferentiation is called an antiderivative

Sometimes it’s called an inverse derivative

Antidifferentiation is also called "**integration**"

**Integration**

*y* = *∫* 12*x*3 *dx* means y is the original function that was differentiated to get 12*x*3

The integral of ƒ(*x*) where ƒ(*x*) is called the "integrand"

*∫* is the integral sign

It stands for "S" for sum

It represents an infinitely-tiny sum (sum is the inverse of difference, the "d" in dy/dx)

the *dx* merely acts as a reminder that "*x*" was the variable whose changes cause the

change in "*y*"

#### Indefinite Integral

When we take the derivative of a constant, it is zero

When integrating, unless we have more information (like a value the original graph goes

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through) we can never be definite about what the original equation was

So these are called “**indefinite integrals**”

We put a "+ *C* " at the end to represent the unknown constant in the original equation

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*C* is the constant of integration

**Integrand Notation**

*∫* is the integral sign

*∫* 10x4 dx = 2x5 + c

constant of integration

integral sign

integrand

indefinite

integral

differential

variable of

integration

**Rules for Integration:**

 **Constant Rule:**

*∫ dx* = *x* + *C*



**Power Rule:**

*∫ x*n *dx* = $\frac{x^{n+1}}{n+1}$ + c *n* ≠ -1

 **Addition Rule:**

*∫* [ƒ '(*x*) + *g* '(*x*)] *dx* =

*∫* ƒ'(*x*) *dx* + *∫* *g* '(*x*) *dx*

**Coefficient Rule:**

*∫* k ƒ'(*x*) *dx* = k *∫* ƒ'(*x*) *dx*

