**Colorado Technical University**

**Course:** MATH205 – Differential Calculus

#### Unit 4 Part 7 Readings – Product and Quotient Rules, Transcendentals

**Rule #4: Derivative of a Product:**

If *y* = *u* × *v* where *u* and *v* are functions of *x*, then:

 $\frac{dy}{dx}$ = *u* $\frac{dv}{dx}$ + *v* $\frac{du}{dx}$

**Rule #5: Derivative of a Ratio:**

If *y* = *u*  *v* where *u* and *v* are functions of *x*, then:

$\frac{dy}{dx}$ = $\frac{v \frac{du}{dx} - u \frac{dv}{dx} }{v^{2}}$

**Derivatives of Transcendental Functions**

$\frac{d}{dx}$ sin *x* = cos *x* $\frac{d}{dx}$ cot *x* = csc 2 *x*

$\frac{d}{dx}$ cos *x* = –sin *x* $\frac{d}{dx}$ sec *x* = sec *x* tan *x*

$\frac{d}{dx}$ tan *x* = sec2 *x* $\frac{d}{dx}$ csc *x* = csc *x* cot *x*

$\frac{d}{dx}$ sin-1 *x* = $\frac{1}{\sqrt{1-x^{2}}}$ $\frac{d}{dx}$ cot -1 *x* = $-\frac{1}{\sqrt{1+x^{2}}}$

$\frac{d}{dx}$ cos-1 *x* = $-\frac{1}{\sqrt{1-x^{2}}}$ $\frac{d}{dx}$ sec-1 *x* = $\frac{1}{\left|x\right|\sqrt{1-x^{2}}}$

$\frac{d}{dx}$ tan-1 *x* = $\frac{1}{\sqrt{1+x^{2}}}$ $\frac{d}{dx}$ csc-1 *x* = $-\frac{1}{\left|x\right|\sqrt{1-x^{2}}}$

$\frac{d}{dx}$ logb *x* = 1/(x ln(b)) $\frac{d}{dx}$ b*x* = b*x* ln(b)

$\frac{d}{dx}$ ln *x* = $\frac{1}{x}$ $\frac{d}{dx}$ e*x* = e*x*

