**Colorado Technical University**

**Course:** MATH205 – Differential Calculus

## Unit 8 Part 16 Readings – Reverse Chain Rule

**Reverse Chain Rule:** *∫ u*n *du* = $\frac{u^{n+1}}{n+1}$ + c

The Reverse Chain Rule is also called “**integration by substitution**” or “**u-substitution**”

**Derivatives of Transcendental Functions** (used in Reverse Chain Rule problems)

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

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

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

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

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

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

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

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





**Area Under a Curve**