**Colorado Technical University**

 **Course:** MATH207 – Integral Calculus

####  Unit 1 Part 1 Readings: Calculus of Trigonometric Functions

**How to Do Integration Problems**

Trick 0: come up with an equation involving dy/dx (y and x will be the variables you are

## interested in)

## Trick 1: split the dy and dx into two sides of the equation

## Trick 2: integrate both sides

## Trick 3: combine the “c”s

Trick 4: use any known values (like at t=0) to find a value for c

## Useful EE Formulas (thank you, Stephen Yim!)

|  |  |
| --- | --- |
| v(t) = dw/dq v(t) is the voltage (volts) w is the energy (joules) q is the charge (coulombs)i(t) = dq/dt i(t) is the current (amps) t is the time (sec)ic = C dv/dt  ic is instantaneous capacitor  current in amps C is capacitance in farads (F) | p(t) = dw/dt  = (dw/dq)(dq/dt) = v(t)×i(t)p(t) is the power in joules/sec or wattsvcoil = N dw/dt  vcoil is the instantaneous coil voltage (in volts) N is the number of primary turnsVL = L di/dt  VL is the instantaneous inductor voltage L is the inductance in henrys (H) |

**Circuit Analysis**

**Impedance** Z (in ohms Ω) comes from the Pythagorean Theorem:

$$X\_{C}$$

**R**

*θ*

**Z**

Z = $\sqrt{R2+X2\_{C}}$

The p**hase angle** (in degrees):

*θ* = tan-1$\left(\frac{X\_{C}}{R }\right)$

Resistance (R) and reactance (X) are 90° apart, so their angle of

intersection forms a right angle

Adding the impedance (Z) line at the angle *θ* makes a right triangle

This is called the “**impedance triangle**”

**Trig Calculus**

**Derivatives of Transcendental Functions**

$\frac{d}{dx}$ sin *u* = cos *u* $\frac{du}{dx}$ $\frac{d}{dx}$ cos *u* = –sin *u* $\frac{du}{dx}$ $\frac{d}{dx}$ tan *u* = sec2 *u* $\frac{du}{dx}$

$\frac{d}{dx} cot u = csc 2 u \frac{du}{dx} $ $\frac{d}{dx}$sec *u* = sec *u* tan *u* $\frac{du}{dx}$$\frac{d}{dx}$ csc *u* = csc *u* cot *u* $\frac{du}{dx}$

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

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



