**Colorado Technical University**

**Course:** MATH205 – Differential Calculus

#### Unit 1 Part 2 Readings: Functions

**Functions**

An ***x* can have only one *y***

 For every “*y*” you can have more than one “*x*”

Use a **vertical line to test** whether a graph is a function (the **VLT**)

 If a vertical line crosses a graph more than once, the graph is not a function

 A function can have more than one *x*-intercept but not more than one *y*-intercept

**Relation** - any set of ordered pairs

 Ordered pairs {(*x*1,*y*1)...(*x*n,*y*n)}

braces indicate a set

*x* is the independent variable - it can take on any value in the domain

*y* is the dependent variable - it's value depends on the value of *x*

 **Domain** - the *x*s

 **Range** - the *y*s

 (aid to memory: x comes before y; d comes before r)

 Two ways to write domain and range:

* + - Set-builder notation: {*x* | a ≤ *x* ≤ b}
		- Interval notation: [1, 4]

(Tip: The square brackets [ ] indicate that both numbers are

included in the set. Rounded parentheses ( ) indicate that

the numbers are not included. You can have one side

rounded and the other one square.)

functions are usually given as equations rather than sets

**Subscript notation**

 *x*1, *x*2, *x*3, … *x*n

 *y*1, *y*2, *y*3, … *y*n

**Function notation**

 *y* = ƒ(*x*)

**Evaluating a function**

 When you ***evaluate*** a function, you need to substitute the given value for *x* in the

equation

ƒ(2) is the same as saying the value of *y* where *x* = 2

 substitute whatever is in the parentheses for the "*x*" in the function

**Graphs of functions**

graphing a function - graph the ordered pairs

 graphing traditions:

 ○ an open dot in or at the end of a line means the point is not included

 ● a closed dot at the end of a line means it is included but the graph ends at that

 point

 → an arrow at the end of a line indicates the graph goes on indefinitely

**Types of Functions**

piecewise functions - defined by two or more equations over the domain

increasing & decreasing functions & constants

relative maximums & minimums

even functions are symmetric with respect to the *y*-axis ƒ(*x*) = ƒ(–*x*)

odd functions are symmetric with respect to the origin ƒ(–*x*) = – ƒ(*x*)

step functions function values graphically form discontinuous steps

The graph of an **even function** is symmetric with respect to the *y*-axis

(ex: a “U” curve)

The graph of an **odd function** is symmetric with respect to the origin

 (ex: sine: )

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