**Colorado Technical University**

**Course:** MATH116 – Foundations for Calculus

**Unit 6 Part 11 Readings: Composites, One-to-One, Inverses**

Composite functions

Have an order - the output of *g*(*x*) is the input to ƒ(*x*)

New symbols: ƒ ○ *g* ƒ of *g* ƒ(*g*(*x*))

the composition of the function *f* with *g* is the

composite of ƒ with *g*

ƒ ○ *g* ≠ *g* ○ ƒ

Just plug the "inside" function into the "outside" function

**One-to-One Functions**

A function is one-to-one if any two different inputs in the domain correspond to two

different outputs in the range

A function is *not* one-to-one if two different inputs correspond to the same output.

**Horizontal-Line Test -** If every horizontal line intersects the graph of a function in at

most one point, then f is one-to-one

**Warning:** in other disciplines, there is a special line called the 1:1 line (pronounced

one-to-one) which has a slope of 1 (where y=x)

In Math we call this the “**identity line**” or “**line of equality**”

**Inverse Functions -** Undo a function

Definition of the inverse of a function:

If ƒ(*g*(*x*)) = *x* for every *x* in the domain of *g* and *g* (ƒ(*x*)) = *x* for every *x* in the domain of ƒ the function *g* is the inverse of ƒ

Denoted ƒ–1

The domain of *f*  is equal to the range of ƒ–1 and vice-versa

### Finding the inverse of a function

1) Replace "ƒ(*x*)" with "*y*"

2) Interchange "*x*" and "*y*"

3) Solve for "*y*"

If the resulting equation does not define "*y*" as a function of "*x*", then ƒ does

not have an inverse

If the resulting function does define "*y*" as a function of "*x*", then ƒ does have

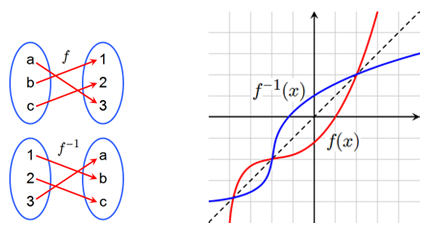
an inverse

4) If ƒ does have an inverse, replace "*y*" in step 3 with ƒ–1

1. Check to ensure ƒ(ƒ–1(*x*)) = *x* and ƒ–1(ƒ(*x*)) = *x*

Because the domain of ƒ is equal to the range of ƒ–1 and vice-versa, an inverse will

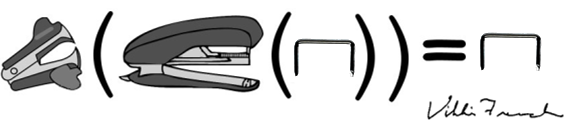
rotate a function about the identity line:

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**Horizontal Line Test** for an inverse function:

If a function has a horizontal line that intersects the function at two or more points, it

cannot have an inverse that is a function (because that would mean it couldn't

pass the vertical line)

