Name: _____ Date: _____ **Unit 9 Class Work**

Proving Inverse Relations via Composition Class Work

Objective: *You will be able to prove inverse relations via composition.*

★ For any two functions, f(x) and g(x), if $(f \circ g)(x) = (g \circ f)(x) = x$, then the functions are inverses of each other.

WORK TOGETHER: *Prove whether or not each pair of functions are inverses.*
**After completing a problem, check with another pair to discuss your work together!*

1. $f(x) = \frac{x+5}{3}$
   $g(x) = 3x - 5$

$(f \circ g)(x) = \frac{3x-5+5}{3} = \frac{3x}{3} = x$ ✓

$(g \circ f)(x) = 3\left(\frac{x+5}{3}\right) - 5$

$= x + 5 - 5 = x$ ✓

f(x) & g(x) ARE inverses

2. $h(x) = \frac{x-1}{2}$
   $m(x) = 2x - 1$

3. $b(x) = \sqrt{x-2} + 5$
   $c(x) = (x-5)^2 + 2$

$(b \circ c)(x) = \sqrt{(x-5)^2 + 2 - 2} + 5$

$= \sqrt{(x-5)^2} + 5$

$= x - 5 + 5 = x$ ✓

$(c \circ b)(x) = (\sqrt{x-2} + 5 - 5)^2 + 2$

$= (\sqrt{x-2})^2 + 2$

$= x - 2 + 2 = x$ ✓

b(x) & c(x) ARE inverses

4. $d(x) = (x+3)^2 - 4$
   $n(x) = \sqrt{x+4} - 3$

5. $r(x) = x^3 + 1$
$s(x) = \sqrt[3]{x+1}$

$(r \circ s)(x) = (\sqrt[3]{x+1})^3 + 1$

$= x + 1 + 1$

$= x + 2 \neq x$

$r(x)$ & $s(x)$ ARE NOT inverses

6. $z(x) = 5x^3 + 3$
$t(x) = \sqrt[3]{\frac{x-3}{5}}$

#2 ARE NOT inverses

#4 & 6 ARE inverses

Exit Slip:

Use function composition to prove whether or not v(x) and w(x) are inverses, given

$$v(x) = \frac{-2}{3x+7}$$

$$w(x) = \frac{-2-7x}{3}$$