Name: ______________________ Academic Integrity Signature: ______________________

I have abided by the UNCG Academic Integrity Policy.

Note: Correct numerical answers without justification will receive little or no credit.

1. (5 points) (The Chain Rule) If f is differentiable at $u = g(x)$ and g is differentiable at x, then the composite $f \circ g$ is differentiable at x, and the derivative is

$$(f \circ g)'(x) = \boxed{}.$$

In Leibniz's notation, if $y = f(u)$ and $u = g(x)$, then

$$\frac{dy}{dx} = \boxed{},$$

where $\frac{dy}{du}$ is evaluated at $u = g(x)$.

Solution:

$$(f \circ g)'(x) = f'(g(x))g'(x).$$

In Leibniz's notation, if $y = f(u)$ and $u = g(x)$, then

$$\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx},$$

where $\frac{dy}{du}$ is evaluated at $u = g(x)$.

2. (5 points) (Computation) Suppose f and g are differentiable functions whose values are given below. Let $h(x) = f(g(x))$. Compute $h'(2)$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	11	-3
2	1	3	π	7
3	1	1	$\sqrt{2}$	$-\frac{1}{9}$

Solution: We compute

$$\begin{aligned} h'(2) &= f'(g(2))g'(2) \\ &= f'(3)g'(2) \\ &= \sqrt{2} \cdot 7 \\ &= 7\sqrt{2}. \end{aligned}$$

 Points earned: ______ out of 10.