Sets and Logic MHF3202 | **SeLo-A** | Prof. JLF King *Touch*: 17Nov2017

A1: Show no work. *NOTE*: The **inverse-fnc** of g, often written as g^{-1}, is *different* from the **reciprocal fnc** $1/g$. E.g, suppose g is invertible with $g(-2) = 3$ and $g(3) = 8$: Then $g^{-1}(3) = -2$, yet $[1/g](3) \stackrel{\text{def}}{=} 1/g(3) = 1/8$.

Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

This is an **Open Brain** but **No calculator** exam.

a Line $y = Mx + B$ is orthogonal to $y = \frac{1}{5}x + 2$ and owns $(4, 10)$. So $M=$ _____ and $B=$ _____.

b The solutions to $5x^2 = 2 - 2x$ are $x =$ _____.

c $\left[\sqrt{2}^{\sqrt{27}}\right]^{\sqrt{3}} =$ _____. $\log_8(4) =$ _____.

d Let $y = f(x) := \left[5 + \sqrt[3]{x}\right]/2$. Its inverse-function is $f^{-1}(y) =$ _____.

e Let $g(x) := x^3 + 4x - 2$. Then $g^{-1}(3) =$ _____ and $[g^{-1}]'(3) =$ _____.

f Below, f and g are differentiable fncs with

$$f(2) = 3, \quad f(3) = 5, \quad f'(2) = 19, \quad f'(3) = 17,$$
$$g(2) = 11, \quad g(3) = 13, \quad g'(2) = \tfrac{1}{2}, \quad g'(3) = 7,$$
$$f(5) = 43, \quad g(5) = 23, \quad f'(5) = 41, \quad g'(5) = 29\,.$$

Define the composition $C := g \circ f$. Then $C(2) =$ _____ ; $C'(2) =$ _____.

Please write each answer as a product of numbers; **do not** multiply out. [*Hint:* The Chain rule.]

g Compute the sum of this geometric series: $\sum_{n=3}^{\infty} [-1]^n \cdot 2/3^n =$ _____.

A2: Math-Greek alphabet: Please write the **two** missing data of lowercase/uppercase/name. Eg:

"iota: α: B: ." You fill in: ι I A *alpha* β *beta*.

Σ: _____ Υ: _____ Γ: _____

ω: _____ ν: _____ ξ: _____

psi _____ rho _____ lambda _____ mu _____

End of SeLo-A

A1:	___ ___	70pts
A2:	___ ___	20pts
Total:	___ ___	90pts

Print name _____ Ord:

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor."*

Signature: _____