Sets and Logic
Course MHF3202

Prereq-A

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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 $[1/g](3) \stackrel{\text{def}}{=} 1/g(3) = 1/8$.

Please 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 The **slope** of line $5[y-1] = 3[x-2]$ is _____.

Point $(-8, y)$ lies on this line, where $y=$ _____.

b Line $y = Mx + B$ is orthogonal to $y = \frac{1}{3}x + 2$ and owns $(3, -1)$. So $M=$ _____ and $B=$ _____.

c The solutions to $3x^2 = 2 - 2x$ are $x =$ _____.

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

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

f Let $g(x) := x^3 + x$. Then $g^{-1}(-10) =$ _____ and $[g^{-1}]'(-10) =$ _____.

g For $x > 0$, let $B(x) := x^x$. Its derivative is $B'(x) =$ _____.

[*Hint:* How is y^z, for $y > 0$, defined in terms of the exponential fnc?]

h Below, f and g are differentiable fncs with

$$\begin{array}{llll} f(2) = 3, & f(3) = 5, & f'(2) = 19, & f'(3) = 17, \\ g(2) = 11, & g(3) = 13, & g'(2) = \frac{1}{2}, & g'(3) = 7, \\ f(5) = 43, & g(5) = 23, & f'(5) = 41, & g'(5) = 29\,. \end{array}$$

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.]

i Compute the sum of this geometric series: $\sum_{n=3}^{\infty} [-1]^n \cdot [3/5]^n =$ _____.

j For natural number K, the sum $\sum_{n=3}^{3+K} 4^n$ equals _____.

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*.

H: _____ Υ: _____ Δ: _____

σ: _____ γ: _____ ξ: _____

lambda psi omega mu

End of Prereq-A

A1:	___ ___ ___	100pts
A2:	___ ___	20pts
Total:	___ ___ ___	120pts

Print name _____ Ord:

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

Signature: _____