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 $g(\text{-2}) = 3$ and $g(3) = 8$: Then $g^{-1}(3) = \text{-2}$, yet $[1/g](3) \stackrel{\text{def}}{=} 1/g(3) = 1/8$.

Please write **DNE** in a blank <u>if</u> the described object does not exist or if the indicated operation cannot be performed.

a Line $y = [M \cdot x] + B$ owns points $(4, 3)$ and $(\text{-2}, 5)$. Hence $M=$ _____ and $B=$ _____ .

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

c The four solutions to $[y-2] \cdot y \cdot [y+2] = \text{-}1/y$ are $y =$ _____

[*Hint:* Apply the Quadratic Formula to y^2.]

d $\left[\sqrt{3}^{\sqrt{2}}\right]^{\sqrt{8}} =$ _____ . $\log_{64}(8)=$ _____ .

e Let $y = f(x) := [7 - \sqrt[5]{x}]/3$. Its inverse-function is $f^{-1}(y)=$ _____ .

f Let $g(x) := x^3 - x$. Then $g^{-1}(6)=$ _____ and $[g^{-1}]'(6)=$ _____ .

g For $x > 0$, let $B(x) := x^{\sin(x)}$. Hence its derivative is $B'(x) = B(x) \cdot M(x)$, where $M(x)$ equals

_____ .

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

h 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.]

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

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

k $\sum_{n=1}^{\infty} r^n = \frac{5}{8}$. So $r=$ _____ or **DNE**.

[*Hint:* The sum starts with n at **one**, not zero.]

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*.

Ω: _____ Ψ: _____ H: _____

σ: _____ γ: _____ λ: _____

theta _____ rho _____ delta _____ mu _____

End of Prereq-A

A1: ___ ___ ___ 110pts

A2: ___ ___ 20pts

Total: ___ ___ ___ 130pts

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

Signature: _____