A1: Show no work. *NOTE*: The <u>**inverse-fnc**</u> 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 $[1/g](3) \overset{\text{def}}{=\!=} 1/g(3) = 1/8$.

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

ℓ1   The **slope** of line $3[y - 5] = 2[x - 2]$ is ....

Point $(\text{-}4, y)$ lies on this line, where $y=$ ....

ℓ2   Line $y = [M \cdot x] + B$ owns points $(4, 3)$ and $(\text{-}2, 5)$. Hence $M=$ .... and $B=$ ....

ℓ3   Line $y = Mx + B$ is orthogonal to $y = \frac{1}{3}x + 2$ and owns $(2, 1)$. So $M=$ .... and $B=$ ....

q1   The solutions to $\quad 3x^2 = 2 - 2x$

are $x =$ ....

q2   The four solutions to $\quad [y - 2] \cdot y \cdot [y + 2] = \text{-}1/y$

are $y =$ ....

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

e1 $\left[\sqrt{3}^{\sqrt{2}}\right]^{\sqrt{8}} =$ .... $\log_{64}(16)=$ ....

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

id1   Suppose g is a fnc with g' never zero. Let h be the inverse-fnc of g. In terms of h, g, g' and x, write a formula for $h'(x)=$ ....

[*Hint:* The Chain rule. NOTE: h is <u>**NOT**</u> $1/g$.]

id2   Let $g(x) := x^3 - x$. Then $g^{-1}(6)=$ ....

and $[g^{-1}]'(6)=$ ....

dq $\frac{\mathrm{d}}{\mathrm{d}z}\left(\frac{\sin(3z)}{\cos(z+1)}\right) = \frac{f(z)}{g(z)}$ where

$f(z)=$ ....

and $g(z)=$ ....

de1   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?]

a   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?]

de2   On those x where $\sin(x) > 0$, define $B(x) := [\sin(x)]^x$. Its derivative is $B'(x)=$ ....

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

dc1   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.]

sg1   Compute the sum of this geometric series:
$$\sum_{n=3}^{\infty} [\text{-}1]^n \cdot [3/5]^n = \quad ....$$

A2: Math-Greek alphabet: Please write the <u>**two**</u> 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: ___ ___ ___   180pts

A2: ___ ___   20pts

Total: ___ ___ ___   200pts