General Course # | **SeLo-A** | Prof. JLF King *Touch*: 18Mar2017

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.

___ ℓ1 The **slope** of line $3[y-5] = 2[x-2]$ is ______.
Point $(-4, y)$ lies on this line, where y= ______.

___ ℓ2 Line $y = [M \cdot x] + B$ owns points $(4,3)$ and $(-2,5)$. 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 $3x^2 = 2 - 2x$ are x = ______.

___ q2 The four solutions to $[y-2] \cdot y \cdot [y+2] = -1/y$ 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 **NOT** $1/g$.]

___ id2 Let $g(x) := x^3 + x$. Then $g^{-1}(10)$= ______ and $[g^{-1}]'(10)$= ______.

___ 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 $B(x) := x^{\sin(x)}$. 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?]

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: $\sum_{n=3}^{\infty} [-1]^n \cdot [3/5]^n$ = ______.

sg2 For natural number K, the sum $\sum_{n=3}^{3+K} 4^n$ equals ______.

sg3 $\sum_{n=1}^{\infty} r^n = 2009$. 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 ______

A2: ___ ___ 20pts
Total: ___ ___ ___ 200pts

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor (or his colleague)."*
Name/Signature/Ord

______ Ord: ______