**DiffyQ Prereq Review-prep** MAP2302 Prof. J. King Friday 10Jan2020

**1:** Show no work. Please take 80 minutes to do as much as you can, then use your Calculus text and the internet to grade yourself. This will help you evaluate what you need to review. *—Sincerely, Prof.K*

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

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

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

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

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

f 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.]

g For $x > 0$, let $B(x) := \sin(x)^{\cos(3x)}$. 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 With $F(t) := \int_{t^2}^{t^3} \cos\big(\cos(x)\big)\, dx$, then $F'(t)$ equals ____.
Simplified, $F'(0) =$ ____.
[*Hint:* Chain rule and Fund. Thm of Calculus.]

i Maclaurin Series $e^{2x} + \cos(3x) = \sum_{n=0}^{\infty} \mathbf{b}_n x^n$ has
$\mathbf{b}_{2k} =$ ____ and $\mathbf{b}_{2d+1} =$ ____.

j Quadratic $15x^2 + 23x + 6 = [Ax - \alpha] \cdot [Bx - \beta]$, for numbers $A =$ ____, $\alpha =$ ____ ; $B =$ ____, $\beta =$ ____.

k Partial-fraction decomposition:

$$\frac{x+1}{x^2+x-2} = \text{____} + \text{____}.$$

l $\int t \cdot e^t \, dt =$ ____.

End of DiffyQ Prereq Review-prep