Staple!

Ord: __ __

Differential Eqns
MAP2302

S-Class

Prof. JLF King
Wedn. 30Jan2019

Welcome. Write **DNE** if the object does not exist or the operation cannot be performed. NB: **DNE** $\neq \{\} \neq 0 \neq$ *Empty-word*. **Write expressions unambiguously e.g, "$1/a + b$" should be bracketed either $[1/a] + b$ or $1/[a + b]$. (Be careful with negative signs!)**

Use "$f(x)$ notation" when writing fncs; in particular, for trig and log fncs. E.g, write "$\sin(x)$" rather than the horrible $\sin x$ or $[\sin x]$.

Recall $[\![x \downarrow K]\!] := x \cdot [x-1] \cdot [x-2] \cdots [x-[K-1]]$, is read as "*N falling-factorial K*".

S1: Show no work.

__ __ **a** Prof. King wears bifocals, and cannot read small handwriting. Circle one: **True!** **Yes!** ***Who??***

__ __ **b** *A* soln to $[f'' - 3f'](x) = 14 - 6x$ is **polynomial** $f(x) =$ ________. Using parameters α and β, then, the *general* solution to $[h'' - 3h'](x) = 14 - 6x$ is

$h_{\alpha,\beta}(x) =$ ________.

And the h with $h(0) = 0$ and $h'(0) = 0$ is $h(x) =$ ________.

__ __ **c** The simplest soln to $y'' + 2y' + y = [t^2 + 1]/e^t$ is $y(t) =$ ________.

__ __ **d** Fnc $y_\beta(t) :=$ ________ is the general soln to $\frac{dy}{dt} = 8t^3 \cdot [y - 5]$. [SoV]

The *particular* $y()$ with $y(0) = 8$ is $y(t) :=$ ________. And this function has $y(1) =$ ________.

S2: Show no work.

__ __ **e** Degree-N polynomial $y = y(t)$ satisfies

$$†: \quad 4y^2 - t^9 y' = 15t^9 + 4t^2 .$$

Thus $N =$ ____. [*Hint:* Don't compute y; just the polynomial's degree.]

__ **f** DiffOperators **P**, **Q**, **R**, **S** are defined as

$\mathbf{P}(f) := f(3) \cdot f'$, $\quad \mathbf{Q}(f) := \cos(3) \cdot f^{(3)}$,

$\mathbf{R}(f) := [\cos(3) \cdot f] + f''$, $\quad \mathbf{S}(f) := \cos(3) + [3f']$.

Then... **P** *is linear:* T F. **Q** *is linear:* T F. **R** *is linear:* T F. **S** *is linear:* T F.

__ **g** Write $\cos(-2\boldsymbol{i})$, which is real, ITOf exp() and add/sub/mul/div: $\cos(-2\boldsymbol{i}) =$ ________.

And $\cos(-2\boldsymbol{i})$ lies in circle the correct interval

$(-\infty, \frac{-1}{5}]$ $(\frac{-1}{5}, \frac{1}{5}]$ $(\frac{1}{5}, 2]$ $(2, 5]$ $(5, 15]$ $(15, 45]$ $(45, \infty)$

End of S-Class

S1:	__ __ __	125pts
S2:	__ __	60pts
Total:	__ __ __	185pts