Differential Eqns MAP2302 3228 **S-Class** Prof. JLF King Wedn., 26Sep2018

S1: Show no work.

b DE $\left[x\mathrm{e}^y \cdot \frac{\mathrm{d}y}{\mathrm{d}x}\right] + \left[8x^4 + 4\mathrm{e}^y\right] = 0$ is <u>not</u>, alas, *exact*. Happily, multiplying both sides by (non-constant) fnc

$W(x) =$ ....

gives a *new* DE which <u>*is*</u> exact. **Did you** *Check?*

c For $t>0$, fnc $y_\alpha(t) :=$ ....

is the gen.soln to $ty' + 3y = t^7$. [*Hint:* FOLDE.]

d Let $U := 3-2\boldsymbol{i}$ and $W := 4+\boldsymbol{i}$. The gen.soln to a CCLDE is $\boxed{y_{\alpha,\beta}(t) = \alpha\cdot\mathrm{e}^{Ut} + \beta\cdot\mathrm{e}^{Wt}}$. The CCLDE that every such $y()$ satisfies is

$= 0$.

....

[*Hint:* Fill-in the blank with the appropriate sum of derivatives-of-y times various constants.]

e The simplest soln to $y'' + 2y' + y = [t^2+1]/\mathrm{e}^t$ is $y(t) =$ ....

f DiffOperators $\mathbf{P}, \mathbf{Q}, \mathbf{R}, \mathbf{S}$ are defined as

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

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

S2: Show no work.

g Degree-N polynomial $y = y(t)$ satisfies

†: $$4y^2 - t^9 y' = 15t^9 + 4t^2 .$$

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

S1:	___ ___ ___	120pts
S2:	___ ___	30pts
Total:	___ ___ ___	150pts